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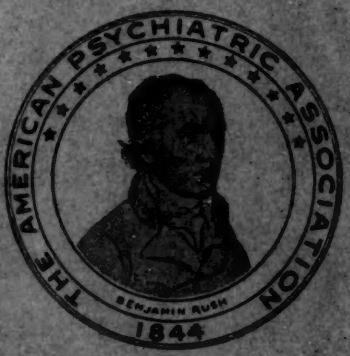

UNDER THE AUSPICES OF
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INTELLIGENCE AND SOCIALIZATION.*

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Somatic medicine cannot, in general, be approached with over-officiousness in problems of the personality as a whole, to which neuropsychiatry is especially dedicated. This discipline, in turn, has often taken its concern as for the functioning individual as such; it has looked upon the more social implications of its problems as the concern rather of the so-called social sciences. It is as though members of an engine-room staff, whose undertaking is to keep bearings oiled, bolts tightened and pistons from knocking, felt called upon for but casual interest in where the ship was headed, and what effect the engine vibrations had on the structure of the hull. More recently such interest seems to have been stimulated by suspicions that civilization's ship is not rising to the waves as she should, or headed where she purports to be.

The social sciences have no greater need than an improved understanding of their human subject matter. A major approach to this understanding is through the social implications of individual differences; and among the best understood of these are the measurable differences of intelligence. Recent tradition has favored an oversimplified view of this relationship, a critical examination of which is here to be attempted.

Intelligence so conceived affects socialization in various ways that cut across each other; the problem should accordingly be considered from different angles. In respect to socializing techniques and institutions, intelligence (cortical development, in neurological symbols) furnishes their human basis. Nothing else evolves such socializing devices as motor transport, radio, moving picture. Here it is pertinent to sketch only a general corollary of this technological socialization. This is the simultaneous indoctrinating of much larger masses of people over very short periods of time, and capitalizing their suggestibility by a wide range of emotion-producing

* Based on papers read at the ninety-second annual meeting of The American Psychiatric Association, St. Louis, Mo., May, 4-8, 1936, and at the meeting of the Boston Society of Psychiatry and Neurology, February, 1937.

devices. In internal propaganda techniques, as in so many others, a preeminent place seems lately to have been achieved by the Germans. It follows that changes in social temper are greatly accelerated, and a form of social organization is demanded, suited to deal with rapid shifts of scene. This is a very plausible factor in the recent setting up, in some parts of the world, of forms of authority more centralized than those of the preceding generation. From the standpoint not of government, but of manners and customs, the effects on bringing people together of the steam-engine, the telephone, the motor-car, particularly the closed car, are too obvious for comment. In technological socialization therefore, the rôle of intelligence has been essentially positive.

From the standpoint of social institutions the situation calls for biological perspective. Human sociality is learned, cortical; insect sociality is inborn, ganglionic. The most perfectly balanced social organizations are[1] practically without intelligence; they were so before man was, and may well continue so long after *homo sapiens* has blown himself to perdition. Reference is obviously to the social insects,[2] more especially to the termites. It is difficult to trace in the biological series, any consistent relationship between sociality and capacity for complex and learned behavior. There are solitary insects as well as social; the sociality or gregariousness of the higher vertebrates seems more related to food habits than to degree of mental complexity, carnivores being relatively solitary, herbivores more social or gregarious. No organization, of course, approaches that of the social insects. As contrasted with the insect, the vertebrate is more dependent for his behavior on the elaboration of experience, or learning. Being without the complicated innate patterns of the insect, the vertebrate's organization for social behavior

[1] Fundamentally, socialization denotes systematic reaction to one's own species, and thus can, conceptually, be extended to the bacteria. The meaning can be further widened to include systematic reaction to other living creatures (biocenoses, Wheeler, 1926), such as parasitism, and without regard to whether the relationship is benign or hostile. For the most part, human socialization denotes benign as well as systematic reactions among the species, hostile reactions being designated "antisocial."

[2] This eventuality was stressed by Stanley Hall (1920, p. 365) precisely on the ground of the more adequate socialization of these organisms. *Cf.* the accounts in Wheeler (1926, 1928); particularly the former in respect to comparisons with human social behavior.

is limited by this learning capacity. It clearly takes more intelligence to support the complicated social institutions of the Omaha Indians,[3] than the simple ones of the elephant. As between human groups therefore, it may be said that intelligence (cortical development), favors the development of social organization, somewhat as it fosters socializing techniques.

Within the group, and especially within that culture with which we are the most familiar, another question is presented. In a social organization, sustained by high intelligence technologically oriented (as is ours), what is the effect on the various intelligences within it? That technologized society raises the highest reaches of the human mind there is no reason to suppose. It is not, I believe, held by any qualified judge that better intelligence exists in the world today than in classical Greece, or in subsequent flowerings elsewhere; or that it is higher today in Germany and Japan which have accepted the power technology, than in China and India which have largely refused it.[4] On the other hand, there can hardly fail to be greater diffusion of mental capacity in the technologized cultures, and the consequently broader intellectual progress that comes from coordinated efforts. For a less condensed treatment of this point *cf.* Merton (1937).

It is necessary to distinguish between the complexity of a social organization and its fixity. Culture that is stable and rigid is in general unfavorable to the deployment of superior intelligence, which is apt to question it. Conversely it is favorable to intelligence sufficient to conform, but not sufficient, or original enough, to dispute.[5] In a compound as well as complex culture like ours, exist

[3] For this and other examples of high socialization in an undeveloped technology, *cf.* Radin (1932).

[4] There are striking differences in cultural plasticity, and they certainly cannot be accounted for on the basis of intelligence. The American negro and Indian are a marked case in point; among groups immigrating to the United States, assimilability varies closely with the distance of the original culture from that to which they come. This was curiously the case in comparing the army groups by intelligence test scores, more than could be accounted for by the language factor (Memoir, 1921, p. 697; *cf.* Klineberg, 1935).

[5] The more stable rural culture tends to lose its higher (psychometric) intelligences to the more active urban environment, and here the less active intelligences gravitate to routine, become "institutionalized." The process is

groups where patterns of thinking and conduct range between extremes of fluidity and fixity. Religious attitudes are readily comparable in this way, and the existence of a higher proportion of the upper intellectual ranges in the freer groups has been variously demonstrated (Leuba, 1916; Starbuck, 1926; Sinclair, 1928; Lehman and Witty, 1931; Fry, 1933; Dudycha, 1934).[6] Again, one may observe the greater social solidarity of manual and machine labor groups as compared with that of headworkers. Miners, longshoremen and garment workers for example, unionize more readily and forcibly than do clerical workers, teachers or physicians. A comparison of conscientious objectors with the war draft as a whole, (May, 1920), disclosed a uniformly higher range of scores in the objector group. It does not seem valid criticism that this conscientious objection was really the more social act. However rationalized, it was essentially the maintenance of a distinctive attitude against an extremely powerful pressure of the social mass.[7] Intellectually as well as volitionally, it is easier to conform than to revolt.[8, 9]

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analogous to the "domestication" of lower animals. Domestication means essentially the socialization of the feline, the canine, the ruminant, for human functions. For a study of subhuman mental powers as affected by this, *cf.* Stone (1932); but the difficulties in comparison are, if anything, greater than those dealt with by Klineberg, *supra.* Human intelligence in the psychometric sense corresponds to Thorndike's (1920) "abstract" intelligence, relatively objective and quantifiable.

[6] Leuba (1916) and subsequently Lehman and Witty (1931 b) show that the degree of religious traditionalism is also related to one's field of work, independently of "intelligence." *Cf.* also Leuba (1934). With reference to comparable studies of conservative and radical groups as such, *cf.* Murphy (1931) citations under "Radicalism."

[7] In view of this generally superior intelligence range, it is pertinent to quote May further (p. 157). "The average conscientious objector is a non-voter, belongs to no social organization, is not interested in community enterprises. The writer has examined more than 50 objectors and not found a single individual who had . . . . held a responsible position in the community." *Cf.* also comments on the "religious literalist . . . . constitutes fully 75 per cent of the conscientious objectors."

[8] Both are necessary for a more than doctrinaire revolt, and are hard to dissociate. Unsupported by drive, intelligence may be unfavorable to revolt, because it is commonly less sure of itself than ignorance. Waits (1935) points out how intellectual careers disqualify one for "opportunity to engage in authoritarian activities"; but for opportunity one may in large measure read inclination (see note 33 below.) The presence, in savage societies, of

By many persons the crux of the problem will be seen in neither its technological nor institutional aspect, but in its ethical phase. It is apparent that the word "social" is repeating the semantic history of "moral," and coming to share largely the meaning of ethical; socializing a child is synonymous with correcting his offensiveness to others; jargon for wrong-doing is "anti-social conduct." An altruistic factor (Trotter, 1921, p. 124) is introduced into the meaning. Within a given group, what is the relation between intelligence and this anti-social conduct? Much of the answer has already been implied. An organism which depends, as *homo sapiens* does, largely on learning for its conduct patterns, must have a certain learning capacity to adjust to its normal environment. A person whose constitutional endowment is in this respect below a critical level, is termed feebleminded. When these things first began to be quantified, 25 or 30 years ago, this critical level was set, for an adult, as high as 12 years of "mental age"; one of 10 years seems now better to represent the facts. We may have here a factor in the finding that mental deficiency decreases in relative frequency as one ascends the scale in correctional institutions. Maturation should result in a higher percentage above this critical level of mental age in the institutions serving the later years. Now from the lowest, perhaps 2 per cent of our intelligences, one expects social adequacy or "morality" no more than from an unhousebroken pup.[10] But

rigid in-groups, with strongly enforced mores, is further testimony to the diminishing returns in social solidarity to be expected from I. Q. above a critical limit.

[9] The location of this critical limit for intelligence, depends on the strictness with which a folkway is observed, and its rationality. If a *no parking* sign is enforced, intelligence will respect it; if it is not enforced, intelligence as such will disregard it. If the sign is clearly reasonable, intelligence may respect it independently of enforcement; if not, intelligence will tend to disregard it. Irrespective of all these, suggestibility will heed it; which puts the suggestible (and more socialized) under special disadvantage where social sanctions are weak. The tenderminded leave the space for the toughminded to occupy it undisturbed. "Only children and suckers obey the 'No Parking Here at any Time' signs in Boston." (Correspondence, *Boston Herald*, April 11, 1936). From the standpoint of international relations, *cf.* Price (1936, p. 615).

[10] Thus the qualities of a good worker, with good disposition, neat about his person, amenable to discipline, have been clinically summed up as those of a "typical feebleminded boy." Typicality may be exaggerated, but it is

correct management will housebreak the pup, and for those who understand these matters the socialization of the imbecile and moron groups is a task neither impossible nor unrewarding. Antisocial conduct may then in the first instance be looked for wherever the measurable intelligence falls below a critical level for the environment. This level is higher, for example, in an urban environment than in a rural. In *homo sapiens* as distinct from termites and ants, therefore, a modicum of intelligence is essential to socialization, whether viewed institutionally or ethically. Such connection as exists between feeblemindedness and so-called delinquency, results from the exposure of inadequate intelligence to over-complex social demands.

Once this critical level is passed, relation between intelligence and morality is extremely difficult of satisfactory demonstration.[11] The prisoner group not unnaturally suggested itself for such comparisons as have been made by Murchison[12] (1924), by Root (1929) and by Doll (1930). In these studies the distribution of intelli-

no isolated case. The well-conditioned moron is an extremely useful citizen. Flippantly, Walter Fernald remarked that "only the feebleminded would still do a day's work." A volume in support of the thesis is offered by Terrett (1930). The contrary argument is excellently presented by Stevens (1936).

[11] Myerson (1933) comments on the low intelligence of the minor offender, though his group is actually well up towards the average, the mental age scores ranging about 13 years. *Cf.* the lack of relationship reported by Ackerson (1936); also Frank (1931) with special reference to type of offense. The group reported by Nakamura and Shikiba (1929) seems to have been of relatively low capacity, while preserving the usual relation in types of offense. Takase and Komotu (1935), dealing with recidivists, call attention to factor of social status and of age; Lane and Witty (1935), dealing with boys, also stress the need for controls of comparable social status. The recent and intensive study by Bartlett and Harris (1936) indicates less difference here than might be anticipated.

[12] Murchison observed that convicts imprisoned outside their home state ranged somewhat higher in alpha scores than those imprisoned in their native states. This is, of course, simply the antisocial phase of the pioneering and exploring energy. It is comparable with the writer's observation that, in Massachusetts, cars from certain other states tend to be driven more aggressively than those of Massachusetts drivers. Those driving outside their district will be somewhat selected for aggressiveness, as is the case with business or antisocial pursuits. To present impression, the local hierarchy in driving aggressiveness ranges (after the fashion of Schjelderupp-Ebbe's chicks) between cars from Connecticut and from Vermont.

gence in a prison population appears not very different from what it is in the milieu from which the convicts come.[13] A clear and understandable relation appears between intelligence and type of offense; fraud shows high scores, violence and sex low ones.[14] It is recognized that the prison, and institutions generally, are but partial selectors of antisocial conduct.[15] Much of it escapes official notice;[16] at least as much more is not amenable to statute at all, and precisely here are the higher intelligences most involved.[17] Evidence of intelligence as a significant factor in morality is absent from these sources.[18] The motivational studies of antisocial conduct have actually indicated a dynamic allied rather to that of neuroses. "And we shall observe it in knaves themselves," wrote a wise man in 1620-odd (Earle), "for those that have wit to thrive by it, have art not to seem so."[19]

[13] *Cf. also* Memoir (1921, pp. 800-802, tables 348, 349, and graph). "It thus appears that low intelligence is a factor in less serious delinquencies, but in the graver difficulties intelligence as measured by the army test seems to play no part."

[14] For a parallel influence of acculturation, *cf.* Stofflet (1935). "Thou shalt not kill; but needst not strive . . . ." etc., according to Clough's decalogue of enlightened selfishness.

[15] For a penetrating discussion of the factors that make it so, *cf.* Merriam (1935, pp. 86-101).

[16] Aside from apprehension, Raeder has pointed out that in some communities delinquency standards are exacting, and require a considerable background of antisocial experience before one may qualify as a "first offender" (Correspondence, *Boston Herald*, January 18, 1934).

[17] The measurements involved concern mainly the "abstract" intelligence of Thorndike, particularly reflected in language manipulations. There are some shreds of evidence (*e. g.*, Fauville, 1935) that non-verbal intelligence as represented by performance tests so called, has a more consistent relationship. Experiments with mirror-writing (Holsopple) are of significance in this connection. *Cf.* Michaels and Schilling (1936) on the Porteus mazes. How far such responses are selective for antisocial rather than other types of adjustment difficulty, is still problematical.

[18] That authors of such experience and insight (Healy and Bronner, 1936, p. 60) should express "surprise" at discovering this situation in their data, is perhaps the best rationalization of a critique such as is here undertaken. That phase of Pollyanna-complex would scarcely have been "Aristotelian" if it had not already been Platonic. The pupil was much the more fact-minded person.

[19] The historic concept of "moral imbecile" probably had its origin in some of the more dramatic instances of dislocation between intelligence and altru-

Three centuries later, in the early days of intelligence measurement, Thorndike (1920) made the point that certain men of scientific distinction could without fear of detection, murder as they wished. Their presumptive failure to do so was cited as evidence that high intelligence is a safeguard against antisocial conduct.[20] This line of reasoning is open to obvious question; but the point is well taken that such intelligences have in their very functioning, satisfactions normally greater than crude criminality is likely to supply. Society should therefore have little violence to fear from the personal conduct of the high intellectual. That it is on the other hand, often hard for the greatest intellects to adjust their personal relationships in a world geared to simpler mental functioning, the literature of " genius and neurosis " has amply attested.[21] As much is true however, of any marked dislocation between mental capacity and socio-economic demands.

Accordingly in a culture such as ours, intelligence symbolized by less than 10 years mental age, is of itself, a social liability; but this liability decreases, and is probably neutralized throughout the normal range of intelligence.[22] The very high reaches of intelligence are apparently a social asset, since intellectual activity becomes at this level more of an end in itself, with fewer anti-social motivations. But before this level is reached, there appears to be a zone where

istic attitudes. The term has gone out of fashion, but the facts it represents are clear enough; psychoanalysis abounds in more misleading metaphors. Attempts at cerebral localization of the moral function are described by Yawger (1935).

[20] " Flexner or Carrel could poison their enemies and rivals except for the tradition of justice and generosity which the positive correlation of intellect and morality has made a part of scientific work and which their own natures gladly maintain." A similar thesis is recently maintained concerning rulers (Thorndike, 1936).

[21] Archimedes, with his fatal " *Noli turbare circulos meos!* " furnishes the classical symbol. *Cf.* Hollingworth (1936) on the optimum of high I. Q. Also the emotionally stabilizing effects reported from prefrontal lobectomies.

[22] This appears the principal basis for the conclusions reached by Chassell (1935). What ever relationship exists is certainly not linear (Chassell, pp. 420, 431, 461). The work there collated is also largely with juveniles, and there is reason to think that low intelligences are more common among young delinquents than among those of riper years (*cf.* Slawson, 1926, pp. 166 ff.). The meaning of morality is also for the juvenile different from what it is during adult years, and morality is judged differently according to age and social status (Chassell, p. 310; Anderson and Dvorak, 1928).

superior intelligence is more of a liability to social conformity.[23] On the one hand the more active mind chafes under the established restraints, on the other it is fertile in means to evade them. Nor must one neglect the antisocial functioning of technologies originating with the inventive mind. An interesting comparison can be made of their social and antisocial properties. The concealable firearm has such marked antisocial potentialities that it is a common object of restrictive legislation; as the automobile simplifies a range of criminal operations impracticable in horse and buggy days. In general the antisocial properties of such devices are a function of their diffusion. The automobile which anyone can own, the gat which anyone can carry, are examples. In its beginning, the war use of gunpowder was a factor in centralizing authority; with us, the bandit is often better armed than the police. At present the airplane, and radio transmission, whose use is more restricted, are by comparison favorable to the law. As such, techniques to diffuse information are favorable to constituted authority; but a diffused device for transporting things or persons, like the automobile, relatively favors the predator on society. From this standpoint a condition relatively difficult for the predator would be one of many railways but few automobiles, few telephones but a good telegraph and broadcasting system.[24] Insofar as warfare is looked on as antisocial, technology improves the fighting instruments, and again sets up high popular tensions (for either war or peace) too swiftly for conventional diplomacy to cope with them. An early instance of this is found in the Ems telegram to Bismarck.[25]

It emerges that dependence on an increased average of mental alertness [26] for a more ethical socialization has no necessary place in educational theory or in statecraft. Suppose that, other traits remaining the same, human intelligence maintained its dispersion,

[23] A note by Young (1936) takes for granted a general belief that high college standing is a social liability and is content with a finding that the two capacities are not appreciably related.

[24] These are conditions obtaining, by comparison with the United States, largely in Britain, and may play a part in its more effective control of crime.

[25] A remoter effect is to make all statecraft more of an opportunistic, hand-to-mouth process, and decrease the opportunity for long term planning.

[26] ". . . . the selective breeding of intellects which, when all is said and done, is the chief office of higher education." (Heller, 1927, p. 38), in an article significantly titled; but *cf.* note 43.

but its average were stepped up to where its upper quartile now is. Life would be more exciting; it would not be more moral. Psychosomatic differences of all sorts are a basis of excitement; to morality they are a challenge.[27]

This brings one to examining the status of socialization as a cultural goal in principle. Cultures differ considerably in the degrees of socialization they tolerate. Many savage cultures tolerate a good deal; soviet Russia tolerates much; we have tolerated by comparison little. It has been pointed out that the libertarian traditions associated with the Germanic language stocks, have expressed themselves variously in an intolerance of more or less remote social control (*cf.* Roscoe Pound, 1931).[28] *Homo sapiens* is imperfectly a social animal. The logical end of sociality is either super-humanization towards the ideals of a Christ or a Buddha, or dehumanization towards the termites.[29]

[27] Motor-car mores are again a ready reference for the cultural approval of competent aggression above sociality. From a suggested drivers' examination: "Explain in detail how old-fashioned road courtesy is a symptom of cowardice. Of imbecility." Again, "Three young drivers, who can handle cars with skill . . . . rushed side by side. . . . . If any one of the three, for the sake of observing the law or the safety of others, had dropped behind, the other two would have taunted him . . . . Milquetoast." (Newspaper correspondence.)

[28] This does *not* denote conduct of the conventionally antisocial (delinquent, criminal) sort. Its basis is a restriction of the in-group. (Particularism, states' rights) conformable to custom within that group, but resistive to authority of a larger unit, or to governing its actions with respect to coördinate units. In terms still more restricted, *cf.* the use of highway snow-fences in summer by neighbors for kindling or pen-building, cited in *Science News Letter*, January 16, 1937, p. 43.

[29] The child suggests itself as a principal socializing force (Matt. xviii, 2 ff.). It is often said that the best social order is that best for the rearing of children. In our culture they obviously help to socialize the members of a family group, but from the standpoint of large social units this influence is problematical. The multiplicity of child-caring agencies could be looked on as signifying failure of the community as a whole to respond to socializing influence in the child (*cf.* Mead, 1928). Properly, the animal pet has the same rôle for socializing the child, as the child has for the adult.

"Even the intensification of nationality witnessed in the existing human society has its counterpart in the hostility of every colony of social insects towards every other colony, even of the same species. A society of the type towards which we may be drifting might be quite as viable and quite as stable through long periods of time as the societies of ants and termites, provided it maintained a sufficient control of the food supply." (Wheeler, 1926.)

The bases of secular individuality, as opposed to sociality, are found among the somatic drives. An inflated id knows no superego; or as Gordon Allport (1936, p. 199) sums up some experimental findings, "the self is first and foremost a physical self." A neurologist might have written, a "thalamic" self, or an "autonomic" self. The bee colony socializes itself by asexualizing most of its members,[30] and constituting them to get their food at a "community store." Similarly among domesticated mammals, castration is a common means to increased conformability, if one can afford the price in modified energy and alertness. The point is illustrated in the distinct preference for female dogs in the highly social pursuit of guiding blind persons (Humphrey, 1934; 1937, p. 304). (More to the general point at issue are Humphrey's following remarks: "It may not take a great deal of gray matter for a dog or an individual to follow instructions . . . . it may take a great deal to study out a way to *avoid* doing what has been asked"; with very apt reference to the comparative psychology of the poodle and the dachshund.)

Confronted with similar problems, *homo sapiens* mortifies the flesh as in the hermitage, institutionalizes it as in marriage, sublimates it as in the laboratory, lives it out as in the continuous bath. The unsocial, etymologically "immoral" factor in the somatic drive is an observation as old as Genesis.[31] To recount the more and less

[30] It is commonplace that in the biological series generally the male makes the more active response to sex tensions, and thus in conformity with the essentially "selfish" nature of the somatic drives, he takes on the more antisocial character. Wheeler (1934) gives a most pertinent discussion of this "problem of the male." A sexually repressed culture has particular problems in socialization under sex restraint, as of prisoners, *cf.* Nelson (1933) and the account in *Time* (February 5, 1934); on the other hand, Daniel (1931), Smythe (1931), also Fishman (1934). In the lower animals we look to castration for analogous results, and may widen its scope as the human problem becomes more acute.

[31] Scene, conference room in the home offices of the Powers of Darkness. Time (Ussher) 4006 B.C. Meeting of Committee on Planetary System No. K-30. Present: Apollyon, Belial, Lucifer, Moloch, Mephistopheles, *Chairman*. The chair reports in part for the subcommittee on *homo sapiens*, as follows: "Conformably to ethical principles with which we are all familiar, your subcommittee has arranged for a number of human traits which involve exploitation of the living environment; and we expect that these will be sublimated, so to speak, into ambitions for material goods, social

successful efforts of societies in achieving a balance of these conflicting and exploitive aims of their members, has been the task of history.[32] Except that the stage is smaller, biography has the same function. Strong drive, high intelligence and high sublimations mean a Wagner, a Goethe, an Elizabethan England. Strong drives, high intelligence and limited sublimations means an Alexander the Great, a Napoleon, a Mongol war-state, a Spain of the Conquistadores. Limited drive, high intelligence and limited sublima-

power, and their symbols, from which under suitable conditions we might expect a good deal. But these are not greatly to be relied upon in a Garden of Eden environment, where these can be no real struggle for existence, at least so long as numbers are kept down. Your subcommittee is informed that a rapid increase in numbers is planned, and the resulting competitions can be expected to result in fighting, enslavement, and mutual exploitations of various sorts favorable to our interest. We have, however, an idea to lay before you, that we believe will much accelerate and intensify these processes. It is that some device be worked out, that would call for a very direct, intimate, and emotionally charged somatic use of human beings by each other. The simplest way would be to have them eat each other, or some vital portion of each other. They are likely to do this anyway to some extent, and a specific drive of this kind would not be difficult to arrange. The grave disadvantage is that it would keep numbers down. The recommendation of your subcommittee is of quite opposite nature; that there should be perfected a device by which an individual's psychophysical balance would call for just as direct and intimate a use of someone else, but far from involving death or permanent injury to either, it should be a means to that very hyperabundance of numbers which is so important to all that we wish to accomplish. The details will need a good deal of consideration and your subcommittee defers taking them up until the idea has your approval in principle; although your subcommittee are pretty well agreed that such a device should be localized in connection with eliminatory functions as at present contemplated. Our best hope is to work out something which will so incense the enemy that they will forthwith drive humanity out of the Garden, and into an environment whose physical conditions will be much more favorable to the speedy development of our general plans. . . . ."

[32] In social as well as individual behavior, "*Ideale hat man nur, solange man sie nicht hat*"; solutions achieved lose their value as such. It is true that most Utopian visions do not represent desires of average mankind (and why?); but if they had something which did, they would tire of it in a generation or two. Writing in the main wittily on "The Hell of Nice People," Patch (1934) pictures the damned as occupied in ordinary social amusements; "only the trouble is, it goes on to eternity." It seems not to occur to him that the intonings of the celestial choir do as much.

tions mean the "brittle intellectual" of Kipling's[33] verse (1919) and Woolston's (1936) observations. Strong drives, low intelligence and low sublimations mean the violent recidivist. Low drive with low intelligence is the quality of the feebleminded.

Cultures are further comparable by the ways in which they institutionalize these elementary somatic needs; food customs, sex customs, eliminatory customs. Convention has led to neglect of the one last named, though none better typifies the essential individuality of the somatic. The institutionalized patterns of France and Germany may here be instructively compared with our own more libertarian practise. Similarly in the sex sphere,[34] with a group of young unmarried males reported some years ago by Dr. Peck and myself,[35] the returns showed the more socially inhibited personalities more dependent on the institutionalized contacts of the brothel; the less inhibited were less dependent on this sanction. In this manner institutionalization conduces significantly to freedom, as do traffic lights to freedom of the highway.[36] Like considerations contribute

[33] In the stanzas entitled "The Holy War." *Cf.* Rorty (1936) on the "objective" detachment of the intelligentsia; also note 7 (May); and more recently Woolston (1936, p. 311) as follows: ". . . . West Coast intellectuals at work on a social puzzle. They are more highly educated and less partisan than the run of men about them. They are also less coöperative, because they resent interference with their preferred occupation. They are humane in sentiment, cautious in judgment, restrained in expression. . . . . They shrink from assuming responsible leadership, because that involves swift decision and rash action. . . . ."

[34] For a clever parody of its somatic function, *cf.* Maurois (1934).

[35] "Among those with a history of primary heterosexual contacts, the following traits reported show relative predominance in those having no traffic with prostitutes: Sympathetic relationship with the mother, contentment with the domestic circle, readiness in making friends, ease of mixing with associates, also persuasiveness. Of the entire group having all traffic with prostitutes, only one reported buoyant spirits."

[36] Freedom in such a practice must not be confused with its spread. In this country's recent and disastrous experiment in alcohol control, the breakup of the institutionalized patterns resulted in a wider diffusion of drinking. In preprohibition days a person probably had less social pressure put on him or her to drink (*i. e.*, was freer in drinking habits) than is the case now.

The noble experiment destroyed an institutionalized freedom in the use of alcohol. The following citation from the Omaha *World-Herald*, dated in 1927, defends the experiment on the ground that only the most competent would then be able to procure alcohol. "I'm entitled to mine. . . . . I've

to the absorption by the local intelligentsia of the ideology of psychoanalysis.

Sex and economic functions are clearly distinguished for exploitive properties. In the economic sphere these are a byword, prostitution is also essentially exploitive and marriage readily becomes so. It stands out that descriptively "social" institutions may be ethically much less social.[37] A somatic need is a card, high or low, thus stacked against social morality;[38] intelligence may favor the player on either side. The aggressiveness born of strong drives tends as such to exploit the environment, material or personal; high intelligence may be turned to a benign sublimation, or only make the exploitation more effective.[39]

From the present standpoint one need consider only the exploitation of other persons. A prime factor in these exploitive patterns is that wide range of individual differences by which, in the vernacular, "there's one born every minute—and two to take him." *La République n'a pas besoin de savants,* declaimed the French Revolution, guillotining Lavoisier. One need not discount the "residues" (Pareto) that underlie such a "derivation," or emphasize

earned my right to it by my superior power and standing. It's a usufruct of success. The man in the crowd, who doesn't know enough to be able to rise above it, doesn't know enough to be entitled to use liquor. He can't use it safely. It represents economic waste to himself and to his employer. If any of my employees uses liquor he knows, if I find out, he's fired. I use it because I can use it safely and because I get enjoyment out of it. The country needs no protection against my use of liquor, nor does industry. They do need protection against its use by the crowd. . . . . When the time comes, as it will, when common people can't get liquor while we who have risen to the top can enjoy our cocktails and highballs, prohibition will . . . . add much more to the prosperity and economic efficiency of the United States."

[37] The relation of these factors to antisocial conduct in the individual is discussed by Healy, Bronner and Shimberg (1935). It is however necessary to take a comparative view. The most heavily exploitive cultures are not particularly distiguished for individual delinquency in the exploited classes. Rather is it a token that the exploitation has not gone so far as to take away the individual's spirit for revolt.

[38] *Cf.* the reproaches directed at the Creator in the Rubaiyat, quatrain beginning "O Thou, who man of baser earth didst make," and in the Kasidah (III, 40, 41, 42), stanzas beginning "Dost not, O Maker, blush to hear. . . . ."

[39] In this respect the rôle of intelligence is entirely comparable with that of money. An I. Q. has in itself no more ethical significance than a stock certificate. In either case does it, or does it not, operate benignly in the community?

that the republic had still less need for its *enfants du bon Dieu*—feebleminded to us—to realize that democracy's distrust of the expert spring partly from the lesson that that expertness—superior abilities of all sorts—frequently do not function in the social interest.[40] The more intelligent exploit the less intelligent, as stronger wills exploit weaker. There is little socio-moral gain in stepping up the cortex, unless one steps down the thalamus and the autonomic. If one is building a moral humanity, one of the first things to arrange for is a considerably narrower range of trait variations, intellectual and behavioral, than now characterizes civilized culture.[41]

[40] One will still do well to consult the thoughtful treatment of the matter by Joseph Lee (1908). It is exemplified in the development of the coroner's function in Anglo-Saxon culture, compared with the institutes of forensic medicine on the continent. "It is a pity that we in England are so convinced that professors do not count" (Inge, 1923, p. 128). The point is also dramatized by Rorty's "Yowzir" (1936, ch. 7). There is a profound cultural inconsistency between this attitude and the heavy commitment to education with "their naive belief in it as a cure-all . . . . transform dullards into bright men, and produce statesmen and leaders from a set of average humans" (Tunis, 1936, p. 326). Both these observers associate this with cultural suggestibility of a more general nature; "the idolatrous belief of the American nation in slogans and shibboleths" (Tunis, *ibid.*), and "Americans' addiction to make-believe" (Rorty, p. 13).

Democracy may distrust the expert as such; but it follows readily the lead of personalities that attract its interest. Upon this trait was based the well-developed art of testimonial advertising. Yet it should be noted that some large advertising has favored the use of commonplacely worded testimonials attached to obscure names. The basis is that the imagination of the group to which appeal is made is unable to leap the gap required for self-identification with a more *distingué* signer. It would reject an appeal that made this demand, but accepts one that calls only for identification with one of its own socio-economic class (*cf.* the "man-of-the-people" electoral appeal).

[41] *Cf.* Veblen (1915, pp. 9-10): "A larger, fuller, more varied and more broadly balanced scheme of culture will, under tolerable circumstance, be found among such a people than in a community made up of individuals that breed true with a close approximation to a single specific type." On the other hand: ". . . . a hybrid population will of course, also have the faults of its qualties. The divergence of temperament and proclivities will be as wide as that of its capacities and aptitudes; and the unrest that works out in a multiform ramification of achievements on the one side is likely to work out also in a profuse output of irritation and dissentient opinions, ideals and aspirations on the other side. For good or ill, such has been the congenital

From such a standpoint this is decidedly more relevant than raising the present intelligence average.[42] It "takes all kinds of people to make a world," is the common man's good-natured apology for aberrant traits; but he negects the corollary . . . . "and now look at the damn thing."

Order, liberty, individual differences; any two can be had, but they must be paid for with the third. The termites have excellent order, and constrain themselves with neither neuroses nor police; but their individual differences are so small that their freedom is of little effect. The mining camp of *homo sapiens* has freedom, and individual differences in plenty, but little order. In fascist Germany individual differences are as with other peoples, and there is order, but the shrieks of freedom have long turned to gasps. Another great nation, noted for individualistic philosophy, deliberates between new found order, and libertarian tradition.[43]

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makeup of the western peoples, and such it may be called to mind, has also been the history of western civilization."

Acculturation to a socialized ideal would thus involve many changes highly unacceptable to the human nature with which we are familiar. In addition to the rigid curb on economic initiative, the amount of variation in personality traits generally would need to be strictly limited, and the somatic drives much reduced in value. There must be close control in propagation, both quantitative and qualitative, and of the forms permitted to survive; initiating a human life would be a responsibility not less serious than terminating it. The happiness of the survivors would be that of well cared for cattle. Humanity can organize a fair Utopia for cattle, and even for the feebleminded, but it has to be imposed from very far above.

[42] The observation that "an Indian tribe might starve, but never an individual Indian" (*cf.* Swanton, 1930) denotes a closer sympathey between members of this culture than is found at more complex levels. The relation between this social sympathy and the range of individual differences in traits generally can be no simple one, but one would expect it to be in general negative.

[43] An important contribution of intelligence to morality may be on the æsthetic side. "The vile or vulgar mind not only cannot discern beauty; it is a great destroyer of beauty everywhere" (Inge, 1923, p. 31). While intelligence can exist without beauty, the reverse is less true, and the high intelligence is, in general, much less tolerant of ugliness than is the low. The ethical values that inhere in beauty are thus favored by a raising of general intelligence level. Unfortunately the favor is not exclusive; "ugly as sin" is a simile but little more factual than "fit as a fiddle" or "meek as Moses."

Press correspondence, May 31, 1936: "Last Saturday afternoon . . . . cemetery resembled the city dump; there were piles and piles of paper boxes

For some time I have wished that mental hygiene could be studied more inductively; that the antecedents and background of healthy personalities could be described, with references to a more rational ordering of education procedure. The mental hygiene of culture offers a broader challenge of the same sort. A visitor from Mars,[44] studying the human personality, and some part of its culture history, could well be pardoned for concluding that human beings were in their very nature incapacitated for achieving a harmony of individual difference, liberty and order. Yet there is record of good achievements of this sort, as Rome under the Antonines, and if the historical perspective is not too distorted, the Scandinavian peoples of our own day. Given a large scale administration similar in competence to that of a well-run state hospital or state school, it is the simple and encouraging truth that the normal participants in a given culture, in spite of the above handicaps, show no mean capacity for behavior socially benign.[45] It is perhaps more than half true that, as with problem children, a bady adjusted people is a badly administered people.[46] Repeatedly it has been

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and remains of lunches, and even tin cans in evidence. Taps had been left turned on, and water had mixed with the debris to form a muck that defies description. And then as if the city of the dead had not been sufficiently ravaged and desecrated, scores of ragged urchins trooped about, some carrying spades and shovels, and trying to sell their services." (*Boston Herald*, June 2, 1936.)

[44] The constructive imagination of a Stapledon (1932) made the Martian society consist of a single organism which under ordinary conditions could dissociate itself into parts each having an individuality comparable to that of earthly beings; and under emergency redintegrate itself into the single organism having resistless power. Stapledon thus carries to its logical end the concept of Hobbes' Leviathan, and such attenuated forms of it as "General Will" or "Group Mind."

[45] "If a man were called on to fix a period in the history of the human world, during which the condition of the human race was the most happy and prosperous, he would, without hesitation, name that which elapsed from the death of Domitian to the accession of Commodus. . . . . These united reigns (Antoninus Pius, Marcus Aurelius) are possibly the only period in history in which the happiness of a great people was the sole object of government." (Gibbon.)

[46] Whether the administration is of their own making, or imposed upon them by ill-considered decisions of other peoples into whose power they have temporarily come.

pointed out that in social crises at least, there are large numbers of persons who weigh somatic motives but lightly. To harness this fact to less emergency situations was precisely the problem posited by William James (1910) in his famous "Moral Equivalent of War."

Mental hygiene must not however share the moral illusion that because a pattern of conduct is antisocial, it is thereby bad mental hygiene for the individual.[47] The Palestinian of 30 A. D. may have been (as T. E. Lawrence says of the Arab today), unable to live by bread alone; but plenty of modern Nordics and Mediterraneans are capable of well-sustained effort in this direction. The saying applies rather to society than to the individual. "Spiritual values" and "enlightened selfishness" have become clichés, but they symbolize the ineluctable demand for response at levels further and further from the somatic self; more endbrain and less tweenbrain (Cobb, 1936, pp. 57 and 67, and Hartmann, 1936).[48] To learn the cultural patterns that elicit such response in relation to the individual human psychology from which it must be evoked, is the highest reach of political science. To be guided by such knowledge is the highest statecraft.[49] These disciplines, like psychology itself, have barely reached their foothills;[50] a few men like Sumner, Pareto, Veblen, at least saw further if in different directions.

[47] That altruistic satisfactions have to the doer the same self-reference as do intellectual, sadistic or eliminatory satisfactions, is, from the standpoint of psychopathology, axiomatic. Yet from a more academic angle this apparent axiom has been called "killing a problem with words." *Alles vergaengliche ist nur ein Gleichniss;* but from the symbolic level of the human organism as a whole, the problem cannot be killed with words or otherwise, because it does not exist. A greater concern for the verbal orders of symbolism can doubtless by such means galvanize a lay figure of the problem into a semblance of life sufficient for purposes of dialetic.

[48] *Cf.* Berle (1935); Collins (1935); as well as the letter that forms the closing pages of "Lady Chatterley's Lover."

[49] For a critique of local tendencies from this angle, *cf.* Sokolsky (1935).

[50] An example is the status of imprisonment as a social measure; *cf.* Hacker (1932), and Fishman (1935), also from a more intensive standpoint, Rowe (1935). Extract from a certain follow-up study of delinquent children: "Two boys who showed improvement after clinic treatment have been in training schools but have never seemed to benefit by the discipline. They are, therefore, still confined in the schools."

"This language is rather shocking," writes a most distinguished biologist some years back, "but it would be easy to draw up a list of 50 well-meaning superannuated reactionaries, headed by . . . .[51] who within recent years have done more harm to civilization than any equal number of criminals one might select." Other arbiters, other values. Referring to the contemporary Leopold and Loeb, Professor Wigmore commented as follows: "As everyone knows, today is a period of reckless immorality and lawlessness on the part of younger people, at the ages of 18-25. It is more or less due to the vicious philosophy of life, spread in our schools for the last 25 years by John Dewey and others—the philosophy which worships self-expression, and emphasizes the uncontrolled search for complete experience." (Dr. Dewey's (1936) moving sponsorship of organized ("cooperative") intelligence is fresh in the memory of those who heard it.) In the same year, a learned theologian (Bell, 1936) offers similar self-expression: "John Dewey, America's most influential educationist, is completely committed to Rousseau's estimate of man. His philosophy is, therefore, essentially romantic and unrealistic; but notwithstanding, he and his followers have corrupted education in America to an almost incredible extent; and our children are, in consequence, being trained in a notion of man's nature so untrue as to make our temper hysterical and our culture increasingly fragile."

One need hardly share in these extremes to perceive that, as the antisocial rôle of intelligence defect has been much exaggerated, there has been corresponding illusion with regard to the benign sociality of superior intellectual development.[52] Here one has to

[51] *De mortuis* . . . . a distinguished protagonist of the traditional versus the biological view of evolution.

[52] Its dynamic is traceable through the following: persons most concerned to make and utter speculations along these lines will be persons who do combine intelligence and morality, as did their Attic forbears. Their social contacts will be largely among persons of similar type. Under these circumstances it is natural enough that they should read this psychology into the world at large (identification, projection), precisely as members of a criminal group look upon the human world as a place of jungle morals. A talented leader, whose following is drawn principally from a group preselected for conformability, and who is subject to at times fulsome adulation therefrom, is particularly exposed to a one-sided view of this matter, which it is easy to rationalize. A feature of it little discounted by protagonists, is the

reckon not so much with crude somatic drive, as with those less defined processes known variously as "self-regarding sentiments," "will-to-power," "ego strivings."[53] Their somatic correlate is obscure; to quasi-analytic view they become partial sublimations of the crude somatic, as superego functions denote more complete sublimations. A generation ago Woods (1906) pointed out how these personality factors, in hereditary sovereigns, affected the destinies of their peoples. To the same general purport, the recent "Insanity of War" document of the Netherlands Medical Society (1935, p. 3)[54] concerns itself more with the opportunistic leaderships of the contemporary scene. As a corollary of that pronouncement it must be kept in mind that desire for social power has as such no more moral significance than an intelligence quotient, can well as an ego-striving tend to expression in ways socially malignant.

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ease with which it turns around. If wisdom desires the good life, then whatsoever "we of the high I. Q." desire is the good life; which gives to high mental powers a privilege with moral law, denied to the less endowed.

[53] Thus Veblen (1919, p. 399); "Under modern conditions the struggle for existence has in a very appreciable degree been transformed into a struggle to keep up appearances."

The classical text for this order of human exploitation has long been Machiavelli's "The Prince." *Judges,* ix, 8-15, is a fair symbol of social authority declined in the presence of more concrete means to satisfaction, and sought for the very lack of these means. Only the parable neglects to go on and relate how afterwards the olive, vine and fig-tree complained bitterly of the bramble's extravagance and corruption.

So far as exploitive functions are concerned, "will-to-power" is quite comparable to the basic somatic drives, but its genetic relation to these drives is a difficult problem. To call it sublimation in the Freudian sense is at best a statement that fits the facts but partially. *E. g.,* specific sex drive normally regresses during later years, while will-to-power does not. It may appropriately be given an independent status as a channeling of the Jungian "libido."

[54] "From the utterances of well-known statesmen it has repeatedly been evident that many of them have conceptions of war that are identical with those of the average man. Arguments such as 'War is the supreme Court of Appeal' and 'War is the necessary outcome of Darwin's theory' are erroneous and dangerous, in view of the realities of modern warfare. They camouflage a primitive craving for power and are meant to stimulate the preparedness for war among the speaker's countrymen, ... We psychiatrists declare that our science is sufficiently advanced for us to distinguish between real, pretended, and unconscious motives, even in statesmen. The desire to disguise national militarism by continual talk about peace will not protect political leaders from the judgment of history. . . . ."

This may be a reason why hereditary rulerships resulted no worse than they did; they put authority in the heir's hands, whether or not he needed it for ego-satisfactions. But for the technological reasons implied at the outset, national destinies are likely to become more dependent on leaders for whom power is an ego satisfaction, as in the post-war dictatorships; so that at no time in history has the development and orientation of leaderships offered weightier challenge to intelligence in socialization.[55]

Clearer standards for the validation of sociality are desirable. In his illuminating book on the Personality of Criminals, Dr. Stearns (1931) alludes sympathetically to school ratings on a basis of socialization rather than of academic accomplishment. Applied on a cultural scale, this should similarly encourage a society in closer appraisal of its institutions, and diffuse among its members a more critical interest in their perfection. Among the factors would be the suicide rate and the homicide rate. Antisocial conduct as such cannot be so considered, because the concept is too vague, but the rate of major violences against the person is a legitimate factor. Another important item would be the amount of dependency, and how far this dependency results from deficient personal endowment, or from cultural failure to furnish conditions in which normal individuals can produce social value in the course of their self-expressions.[56] No doubt many other factors need to be added, as those mentioned need to be qualified. It is not a matter to be elaborated at the close of one's remarks, and is offered only as what the Foundations like to call a "promising lead."

[55] To an extent insufficiently realized, governmental problems are of individual psychology, as well as geography and economics. Attempts to legislate about somatic drives suffer particularly from this insufficiency. To have been the first student of social science to gain a well systematized perception of the principle is a special achievement associated with the name of Pareto, and is his title to the widest recognition. At the time when Pareto wrote, there did not exist the parallel concepts which have developed in psychology. This forced him to invent his own symbols and these have hampered his assimilation among the social psychologists with their different language. The gap that separates political science from human psychology remains unbridged.

[56] The line has to be conventional, and somewhat arbitrarily drawn; in a sense everyone is a "dependent" on the social order in which he lives. But the degree of dependency is greater in the idiot, psychotic or invalid than in the day-laborer, and in the day-laborer than in the skilled and reputed engineer.

It will be recalled how the mice in conclave determined to put a bell on the cat. That is the customary issue of measures in social diagnosis and treatment. Yet there is small doubt that mice with human minds could study the habits of the cat, and in time get the bell satisfactorily attached. Benign socialization must reckon in like manner with the human nature which it has to socialize. Intelligence, as Edith Cavell said of patriotism, is not enough; though both are in a fair way of being too much. If God's problem children want secular harmony and security, the price is to be a race of yes-men; with payment in advance, and delivery not guaranteed. If on the other hand we prefer our present stimulations, inventions, adventure of exploratory variations from a norm, we must not cavil at the price of the recurring, not to say increasing personal failures and social catastrophes of which histories, political and clinical, are so largely a record. A modified distribution of traits like intelligence and some attention to population pressures, affords an outlook favorable from the standpoint of many secular values.[57]

In sum, intelligence is essential to a developed social morality, *but does not of itself dispose thereto.* Among individuals the relation between psychometric intelligence and social conformity, that is to say morality, is anything but linear, and is highly variable throughout its range. At either extreme it is in general positive, though for different reasons at each. As the scale of intelligence in our culture rises from the feebleminded level the relationship becomes less positive, perhaps at times negative, and may be regarded as substantially neutral for the greatest part of the range. At the high end of the intelligence scale asociality may be favored though not antisociality, because lower level motivations tend to be replaced by intellectual, cortical, ones. Somatic (thalamic, autonomic) demands of various kinds have as such a negative influence on conformity irrespective of intelligence; and the same is true of conditions that produce extreme ranges of individual differences in adjustment demands of all sorts.

[57] *Cf.* the "biological purge" of Hooton. For its basis compare the graph appearing in Yoakum and Yerkes (1920, p. 27). Any one of the subdistributions shown might be expected to yield a more *moral* culture than that which actually obtains, irrespective or where the average was located.

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BLOOD ESTRIN LEVEL IN SCHIZOPHRENIA.*

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The primary purpose of this study is to determine possible endocrine factors in the causation of schizophrenia. Only in recent years have the endocrinologic problems been clarified and reliable tests for hormones been evolved so that they could be applied in the study of diseases. Before going into the subject of this paper, a brief explanatory note on the physiology of estrin with some of its chemical properties should be given.

Estrin is called the female sex hormone and, while it does not determine sex, it does cause the development, along with other hormones, of the tubular tract which includes the fallopian tubes, the uterus and the vagina. It is also responsible for the secondary sex characteristics such as texture and distribution of hair, development of breast, and even the tertiary sex characteristics. Various names have been suggested for the hormone, such as folliculin, feminin, ovarian hormone, menformon, amniotin, theelin, estrin and progynon. Theelin and estrin are the names most widely used. Estrin is elaborated chiefly by the graafian follicle and partly by the corpus luteum. To understand the physiology of estrin, it is necessary to know what is meant by estrus, commonly known as " heat " or " rut." This is a cyclic heightening of sexual excitement which has been studied in rodents and it is described by Stockard and Papanicolaou,[1] who state that: " During the anabolic phase of the estrus cycle, the epithelium of the vagina grows to a considerable thickness and a cornified layer similar to that in the epidermis develops. During the catabolic phase, the outer layers of the epithelium degenerate and are removed by leucocytic action. These changes provide a definite succession of cell types in the vaginal lumen, each

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one characteristic of a certain phase of the cycle. Thus the microscopic examination of the vaginal smears is a reliable indicator of the estrual condition of the living animal." Doisy and his coworkers were the first to isolate a crystalline estrogenic compound (dihydrotheelin). Marrian isolated a trihydroxic compound called theelol. Theelol and theelin are both physiologically active but the latter is the more active of the two compounds. Theelin has the formula of $C_{18}H_{22}O_2$. It is soluble in chloroform, benzene, alcohol, acetone and ether. It is slightly soluble in water. Theelol has the formula of $C_{18}H_{24}O_3$ and is soluble in alcohol and acetone.

We were prompted to make blood estrin determinations on a group of female schizophrenic subjects because of the large number that presented physical signs of sex hormone deficiency, such as hypertrichosis, amenorrhea and genital hypoplasia. In addition to these physical signs, a great many of the patients show clinical evidences of weakened libido as manifested by lack of sex interest, loss of object libido, or turning in of the libido to the narcisistic state. The blood estrin level of 186 female schizophrenics was determined and our selection of patients included those between the ages of 15 and 45 years. The tests so far as possible were performed from 1 to 4 days previous to the expected menstrual period because it is at this time, according to Frank and Goldberger [2] that there is the greatest concentration of estrin in the blood. B. Zondek [3] believes its source at this phase of the cycle is the corpus luteum which, in addition to producing progestin, also manufactures larger quantities of estrin than its predecessor, the graafian follicle.

The technic employed in the determination of the blood estrin level is that of Frank and Goldberger [4-6] as modified by Mazer and Goldstein [7] with a slight modification of our own. The technic is briefly as follows:

1. 40 cc. of venous blood are withdrawn 1 to 5 days previous to the expected menstrual flow.

2. The blood is dried with 30 grams anhydrous sodium sulphate.

3. The sodium sulphate-blood mixture is finely triturated and extracted twice with ether. The ether solution is decanted off the sludge and centrifuged at very low speed for 3 to 5 minutes and evaporated to complete dryness in front of a fan.

4. The residue from the ether solution is emulsified in $2\frac{1}{2}$ cc. of sterile water.

5. The emulsion is divided into 3 equal parts and injected at 3 to 4 hour intervals into a previously castrated adult female white mouse, the castration having been performed at least 14 days prior to injection, and vaginal smears having remained continuously negative.

6. The vaginal smears are taken on the test mouse 24 hours after the final injection and each subsequent morning and afternoon until 5 smears have been made.

The vaginal smears are evaluated as follows:

0 = Negative, no demonstrable quantity of estrin; smear consists of leukocytes, mucus and only a few small nucleated epithelial cells.

1 = Positive, sub-threshold level of estrin; smear consists of a preponderance of small nucleated epithelial cells, some mucus and a few leukocytes.

2 = Positive, threshold level of estrin. Smear consists of nucleated epithelial cells almost exclusively.

3 = Positive, normal pre-menstrual level. Smear consists of nucleated and non-nucleated epithelial cells.

A positive is constituted by any demonstrable quantity of estrin.

In order to simplify our experiment we have divided the schizophrenics into three groups: hebephrenic, catatonic and paranoid, with the following results:

HEBEPHRENIC-TYPE.

Estrin level.	No. of subjects.	Per cent.	
0	55	68.75	Negative = 68.75%
1	10	12.50	
2	11	13.75	Positive = 31.25%
3	4	5.00	
Total	80		

CATATONIC TYPE.

Estrin level.	No. of subjects.	Per cent.	
0	30	69.76	Negative = 69.76%
1	7	16.28	
2	3	6.98	Positive = 30.24%
3	3	6.98	
Total	43		

PARANOID TYPE.

Estrin level.	No. of subjects.	Per cent.	
0	44	69.85	Negative = 69.85%
1	9	14.28	
2	6	9.52	Positive = 30.15%
3	4	6.35	
Total	63		

TOTAL SCHIZOPHRENIC SUBJECTS.

Estrin level.	No. of subjects.	Per cent.	
0	129	69.35	Negative = 69.35%
1	26	13.98	
2	20	10.75	Positive = 30.65%
3	11	5.92	
Total	186		

The following groupings show that age has no influence on the results of our tests:

15-25 YEARS.

HEBEPHRENIC.

Estrin level.	No. of subjects.	Per cent.	
0	5	71.44	Negative = 71.44%
1	0		
2	1	14.28	Positive = 28.56%
3	1	14.28	
Total	7		

CATATONIC.

Estrin level.	No. of subjects.	Per cent.	
0	6	66.66	Negative = 66.66%
1	3	33.34	
2	0		Positive = 33.34%
3	0		
Total	9		

PARANOID.

Estrin level.	No. of subjects.	Per cent.	
0	2	100	Negative = 100%
1	0		
2	0		Positive = 0
3	0		
Total	2		

(TOTAL 15-25 YEARS.)

	No. of subjects.	Per cent.
Negative ..	13	72.22
Positive ...	5	27.78
Total	18	

26-35 YEARS.

HEBEPHRENIC.

Estrin level.	No. of subjects.	Per cent.	
0	26	70.27	Negative = 70.27%
1	5	13.51	
2	4	10.81	Positive = 29.73%
3	2	5.41	
Total	37		

CATATONIC.

Estrin level.	No. of subjects.	Per cent.	
0	14	77.77	Negative = 77.77%
1	1	5.66	
2	2	11.11	Positive = 22.23%
3	1	5.56	
Total	18		

PARANOID.

Estrin level.	No. of subjects.	Per cent.	
0	20	76.92	Negative = 76.92%
1	4	15.38	
2	1	3.85	Positive = 23.08%
3	1	3.85	
Total	26		

TOTAL 26-35 YEARS.

	No. of subjects.	Per cent.
Negative ..	60	74.07
Positive ...	21	25.93
Total	81	

36-45 YEARS.

HEBEPHRENIC.

Estrin level.	No. of subjects.	Per cent.	
0	24	66.67	Negative = 66.67%
1	5	13.89	
2	6	16.67	Positive = 33.33%
3	1	2.77	
Total	36		

CATATONIC.

Estrin level.	No. of subjects.	Per cent.	
0	10	66.67	Negative = 66.67%
1	2	13.33	
2	1	6.67	Positive = 33.33%
3	2	13.33	
Total	15		

PARANOID.

Estrin level.	No. of subjects.	Per cent.	
0	22	62.85	Negative = 62.85%
1	5	14.29	
2	5	14.29	Positive = 37.15%
3	3	8.57	
Total	35		

TOTAL 36-45 YEARS.

	No. of subjects.	Per cent.
Negative ..	56	65.11
Positive ...	30	34.89
Total	86	

CONTROLS.

Estrin level.	No. of subjects.	Per cent.	
0	4	8.0	Negative = 8.0%
1	8	16.0	
2	23	46.0	Positive = 92.0%
3	15	30.0	
Total	50		

For the controls 50 normal menstruating women were selected whose ages varied from 18 to 35 years.

The above gives the results of blood estrin determination in both normal and schizophrenic women.

Of the 46 schizophrenic women on whom we have complete gynecological examinations to accompany our blood estrin determinations, we find the following results:

I. *Amenorrheic women with uterine hypoplasia.*
   2 subjects show no demonstrable estrin.
   1 subject shows a subthreshold level.
   1 subject with hypertrichosis shows a threshold level.

II. *Women with scanty menstruation with normal uterus.*
   2 subjects show no demonstrable quantity.

III. *Women with scanty menstruation with uterine hypoplasia.*
   7 subjects show no demonstrable quantity; 2 of these subjects have hypertrichosis.
   1 subject shows subthreshold level.
   2 subjects show threshold level.

IV. *Women with scanty menstruation with uterine hyperplasia.*
   1 subject shows no demonstrable estrin.

V. *Menorrhagic women with normal uterus.*
   1 subject with hypertrichosis shows no demonstrable estrin.
   2 subjects show subthreshold level.

VI. *Menorrhagic women with uterine hypoplasia.*
   1 subject shows no demonstrable estrin.

VII. *Menorrhagic women with uterine hyperplasia.*
   1 subject shows no demonstrable estrin.

VIII. *Oligomenorrheic women with normal uterus.*
   1 subject shows subthreshold level.
   1 subject shows premenstrual level.

IX. *Oligomenorrheic women with uterine hypoplasia.*
3 subjects show no demonstrable estrin; 1 of these subjects has hypertrichosis.
1 subject with profuse menstrual flow shows subthreshold level.
2 subjects (one with profuse flow) shows threshold level of estrin.
1 subject shows premenstrual level.

X. *Oligomenorrheic women with uterine hyperplasia.*
1 subject shows no demonstrable estrin.

XI. *Regular menstruating women with normal uterus.*
7 subjects show no demonstrable estrin.
2 subjects (1 with hypertrichosis) show premenstrual level.

XII. *Regular menstruating women with uterine hypoplasia.*
3 subjects (2 with hypertrichosis) show no demonstrable estrin.
1 subject with hypertrichosis shows premenstrual level.

XIII. *Regular menstruating women with uterine hyperplasia.*
1 subject shows no demonstrable estrin.

CONCLUSIONS.

The disparity between the number of negative tests in the schizophrenics (69.35 per cent) and the normal controls (8.0 per cent) is of rather striking significance. The absence of demonstrable estrin in the blood of schizophrenics provokes much speculation as to the exact disturbance of glandular function. The etiology of the under-production of estrin may be hypofunction or failure of the ovaries, or some change in their chief governing agent, the pituitary gland. An excess of anterior pituitary sex hormone will inhibit estrin production as it causes hyperluteinization of the ovarian follicles. Likewise, an absence of the gonad stimulating hormone will decrease estrin formation. Because of the prime influence of the anterior pituitary sex hormone on the structure and function of the ovaries, our investigations should include prolan determinations and it is our intention to do this as a supplementary study. Whether hormonal imbalance plays a major or minor rôle as a causative factor in schizophrenia cannot be estimated, but our

results would suggest the use of estrin therapy, especially in the early and incipient forms of schizophrenia occurring in the female. Heretofore estrin medication has been limited almost exclusively to mental states associated with the menopause. It would seem a rational procedure to use it in schizophrenia, especially where there is no demonstrable estrin present in the circulating blood. Its use would be essentially a replacement therapy as it is generally conceded that hormones do not stimulate the tissue from which they originate. We know that estrin is not the sole female sex hormone but that progestin, the corpus luteum hormone, plays an important part in the physiology of the menstrual cycle. Smith [8] states that progestin stimulates estrin excretion and therefore lowers the content in the blood, so that one theory in regard to the low estrin content in schizophrenia is that there is an excess of progestin. This is further supported by the fact that dysmenorrhea is rarely found in schizophrenic women. The pain in hormonal dysmenorrhea is due to the uterine contractility caused by persistent action of estrin and unopposed by progestin which lessens uterine spasms. It is also suggested that there may be a chemical reaction which changes theelin to theelol which, being less active physiologically, might increase our number of negative tests. Obviously, there must be a certain estrogenic content in the blood that cannot be demonstrated by the test, for it is inconceivable that women could menstruate at all without some hormonal priming of the endometrium.

H. Zondek states: "There is hardly any hormonal gland which does not receive impulses from the central nervous system and whose loss does not affect the central nervous system in a characteristic but not fully elucidated manner." This being true, the theory that schizophrenia is organically determined is supported by our findings but whether the primary disturbance is in the endocrine system, which in turn affects the central nervous system, or the lesion is primarily in the central nervous system and secondarily affects the endocrine glands, is a matter of conjecture and offers opportunities for further investigations.

SUMMARY.

1. We have shown, by means of the Frank and Goldberger test, that of our 186 schizophrenic subjects 129 (69.35 per cent) show a negative reaction, or no demonstrable quantity of blood estrin.

2. By the same test we have shown that of our 50 normal menstruating women only 4 (8 per cent) show no demonstrable estrin.

3. From this evidence we conclude that in schizophrenia (female subjects) there is a definite imbalance of the gonotropic and gonad stimulating hormones.

4. We suggest the use of theelin (replacement) therapy as a factor in treatment of certain cases of schizophrenia occurring in the female.

5. We realize the important part that the hypophyseal and corpus luteum hormones may play in this imbalance but leave concluding statements on this relation for future investigation.

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DISCUSSION.

DR. ROSS DODSON (Huntington, W. Va.).—I consider this a very important subject. It is a new one, and is probably the logical approach to the cause of schizophrenia. It may be a common sense explanation of symptoms.

It seems that in experimentation such as this that we advance. We recall that pancreatic extract was used in the treatment of diabetes prior to the

discovery of insulin, and that discoveries of this kind are made by persons who study the subject over a long period of years.

Much has been accomplished as regards the diagnosis of schizophrenia and we have traveled a long way as regards the proper treatment. However, it seems that the cause is still a mystery. But when the riddle of schizophrenia is solved, we may expect endocrinology to play a very important rôle.

As we look for physiopathology we sometimes find this in the parenchymatous structures of the brain and many of the endocrine glands. In cases of schizophrenia it has been reported that the gonads are particularly affected, and there is atrophy of the testicles, with a loss of spermatogenesis. Investigators report uterine bleeding after the prolonged use of estrin. This substance is also supposed to influence markedly the motility of the uterus. It would seem that amenorrhea and menorrhagea may be controlled to a great extent by the use of this hormone and progestin. Our primitive personality is exhibited in schizophrenia, and we might picture this as an endocrine system working as a whole to protect the individual in a most unfavorable environment or a compensatory reaction, just as we find the law of compensation and adjustment working throughout the entire universe.

Endocrinology is a field closely interwoven with psychiatric problems. Schizophrenia is usually a disease of adolescence and it would seem that if a normal period could be established during the period of adolescence and the growth period, we would have less schizophrenia as well as many of the other psychotic manifestations.

It is general knowledge that in endocrine disturbance, especially where the thyroid gland is involved, some form of mental retardation, deficiency or inefficiency is found. As regards hormones, I would say that our knowledge as to their location, their action and reactions is still limited. Experimentation has not advanced to the point where we can state they are properly classified and standardized. Estrin is a hormone associated with the sex glands and as such it may be an important factor in the development of schizophrenia.

Dr. George Alexander Young (Omaha, Nebr.).—In view of the enormous amount of work represented by this paper I think that it would be well if such a study with reference to one phase of the organism's reaction were correlated with other aspects of the clinical picture, as shown by the individual cases. And therefore, I wish to ask Dr. Morter whether there had been any attempt to correlate a deficiency or presence of the estrin with other clinical manifestations. For instance, is there any difference in the erotization of the delusions, or in the overt behavior, with respect to those patients who have an absence of estrin and those in whom the estrin is demonstrable?

Dr. Roy A. Morter (Kalamazoo, Mich.).—One thing we were sure of before starting this work was to select typical cases of schizophrenia, and we selected the chronic cases, because of the certainty of diagnoses.

There is nothing more that I want to add, except to make a plea that other laboratories cooperate with us in this work, because I think it has a future with regard to not only differential diagnoses, but possibly also with regard to therapy.

LUETIC HYPERTROPHIC LEPTO-MENINGITIS.

A Clinico-Pathologic Study.*

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As early as 1497 Leoniceno in his treatise on syphilis pointed out that the internal organs were involved in this disease and that paralysis sometimes followed. Astruc mentioned syphilis of the nervous system and pointed out many types of nervous disorder due to this disease. In 1834 Lallemond showed conclusively that the brain and meninges were affected with syphilis, but it was left for Virchow to describe accurately the pathological anatomy of syphilis of the cerebrospinal axis including the meninges.

In a review of 159 cases of meningo-vascular syphilis at the Veterans' Administration Facility, Tuskegee, Ala., 10 cases presented clinical syndromes of a sub-acute or hypertrophic lepto-meningitis. Oppenheim, under "Diffuse Gummatous Meningitis," described a clinical syndrome resembling these cases—early headaches, later vomiting and vertigo with periodic loss of consciousness associated with a hyperpyrexia of short duration, general convulsions, a moderate degree of dementia with failure of memory and apathy, stupors separated by intervals of full consciousness, an associated bulbar paralysis, paralysis of the cranial nerves (especially ophthalmoplegia), and commonly papillœdema with consecutive optic atrophy.

That the meninges may be the seat of syphilitic involvement early in the course of the disease has been deduced both from clinical evidence and from lumbar puncture. Description of the pathological anatomy in early syphilitic involvement of the meninges is a rarity in the literature. Later in the course of the disease meningitis may occur as a diffuse inflammatory process, or as a gummatous condition. It may involve all three of the enveloping membranes of the brain and spinal cord, originating in the periosteum of the cranial bones and later affecting the meninges, or originating primarily in the meninges themselves.

* Read at the ninety-second annual meeting of The American Psychiatric Association, St. Louis, Mo., May 4-8, 1936.

The diffuse inflammatory meningitis is characterized by an exudation of endothelial cells and polymorphonuclear leukocytes and the formation of fibrin. There is generally a marked infiltration of lymphocytes and giant cells are usually observed, while spirochætes are more or less abundant. It is probable that this is the type of meningitis which exists when the meninges are involved early in the course of the disease, although it is undoubtedly less extensive than when the process occurs later. The leptomeninges are adherent, thickened and may contain gummatous deposits either diffuse or circumscribed. Histologically the markedly hypertrophied leptomeninges may become a pseudo-membrane formed by hyperplasia of masses of thick fibrous tissue infiltrated with small round cells, some necrotic but not definitely caseous. This pseudo-membrane, markedly infiltrated with lymphocytes and plasma cells, may extend over the pons and upper medulla and may contain numerous small gummata, within which and in clusters among the small infiltrating cells may be many multinucleated giant cells in which the nuclei are distributed throughout the cytoplasm.

Much perivascular infiltration of the meningeal vessels occurs in this region and many vessels show hyaline degeneration of their walls. Around the upper part of the medulla and over the ventral surface of the pons may be outgrowths of neuroglia through rifts in the hypertrophied pia. Numerous small tufts of neuroglia covered by ependyma may project into the fourth ventricle which in the lower part may appear almost full of newly formed neuroglia. Over the cervical cord the lymphocytic infiltration may extend along the nerve roots as well as into the walls of the meningeal vessels but may not involve the vessels of the cord itself.

The meninges of the cord alone may be invaded by the syphilitic process. The most frequent location seems to be the cervical region and it is most often observed on the posterior surface of the cord. However, the condition may completely surround the cord like a collar. The lumbar region is very rarely affected by this process alone, which is usually associated with vascular lesions.

Clinical History.

That the meninges may be involved in the syphilitic process early in the course of the disease was pointed out above. The earliest

date following infection at which involvement of the central nervous system has been noted is the case reported by Read, in which marked symptoms were present two weeks after the appearance of the chancre. Several other investigators have reported cases of syphilis in which the chancre was present, but no cutaneous manifestations had appeared, in which either clinical symptoms or spinal puncture or both revealed involvement of the central nervous system.

Numerous investigators have reported the involvement of the nervous system slightly later in the course of the disease, that is, during the early active cutaneous manifestations. Wile and Stokes go so far as to state that " In all probability every case of syphilis which reaches the secondary period has more or less involvement of the cerebrospinal axis." Syphilitic meningitis may also occur late in the course of the disease; in fact, Ricord classified syphilis of the nervous system with his so-called tertiary manifestations.

The symptoms of syphilitic meningitis of the brain depend upon the location of the involvement although it cannot always be determined from the symptoms whether the convexity or base is involved or whether both locations are the seat of the pathological process.

Headache is the most frequent symptom of specific meningitis of the base of the brain. It is present in practically all cases and may be the only symptom observed for a very long time. It is usually paroxysmal in character and is described as boring, splitting, stabbing, throbbing. Between the severe paroxysms there may be a dull ache. Not infrequently there may be severe pain deep in the orbits of the eyes and sometimes the headache is localized upon the forehead or over the eyes. Vertigo and even reeling and staggering are often noted. Vomiting, which often occurs without food in the stomach, is a very frequent symptom, although not a constant one, and may precede all other symptoms. The temperature is usually normal, but may be slightly elevated. A very high temperature may be considered a complication. Polydipsia and polyuria are other common symptoms, and diabetes mellitus has been observed.

The psychic symptoms vary greatly. The most frequent condition is one of stupor, from which the patient may be aroused temporarily. There may be a purposeless motor delirium. More or

less complex acts may be performed on command, although the urine and fæces may be passed in bed. There is usually loss of memory, especially for recent events, and disorientation for time and place. There may be periods of excitement or marked depression with suicidal tendency. Consciousness may be retained for a long time, followed by the sudden appearance of coma and death.

General convulsions of an epileptiform type are often observed or there may be partial or unilateral convulsions.

The cranial nerves are usually affected, the resulting symptoms depending upon the nerves involved, such as bulbar paralysis, paralysis of the cranial nerves, especially ophthalmoplegia and commonly papillœdema with consecutive optic atrophy.

Case Reports.

Case 1.—Negro, male, age 36, admitted December 26, 1929, for treatment of chronic pulmonary tuberculosis, complaining of severe pain in neck and back and "cramps" in both arms. The headache became progressively worse. January 2, 1930, patient became restless, nervous, could not sleep and was transferred to the Neuropsychiatric Service, January 4, 1930. Temperature was slightly elevated—100.5, pulse 136 and respiration 24. Patient was mentally dull, apathetic and later semi-conscious; pupils unequal, left larger than right; involuntary urination and stools and a positive Kernig. Lumbar puncture: Wassermann 100 per cent, globulin negative, 4 cells per cmm., fluid xantho-chronic and slight, Lange colloidal gold curve 1234455543.

January 5, 1930. Temperature 101.6, pulse 146, respiration 34. Blood pressure 118/98. Brudzinski, Kernig and Magnus DeKlein signs present. Conjunctiva injected. Pupils fixed to light, diplopia; cycloplegia, right; a beginning paralysis with dysarthria and dysphagia. Had to be fed with a nasal tube. Markedly hypersensitive, would make loud outcries when touched or moved.

January 7, 1930. Temperature 103, pulse 150, respiration 37. Left arm and leg weak. Right arm and leg flaccid. Lumbar puncture: 20 cc. of dark yellow fluid, Wassermann 100 per cent, globulin heavy increase, Lange colloidal gold curve 1234445444.

January 9, 1930. Lumbar puncture and spinal drainage: 25 cc. of yellow fluid. Able to take liquids.

January 10, 1930. Lumbar puncture and spinal drainage: 30 cc. of pale yellow fluid. Talks at random, makes incoherent replies to questions.

January 20, 1930. Able to use right arm and leg, and to reply to questions.

January 21, 1930. Lumbar puncture and spinal drainage: 25 cc. of clear fluid. Given 3 gm. of tryparsamide intravenously.

February 5, 1930. Permitted to sit up in wheeled chair three hours daily.

February 29, 1930. Able to sit out on lawn and to walk about a little. Cheerful, neat and tidy. "Want to go to church and serve the Lord for his kindness to me."

April 2, 1930. Able to walk about the ward. Only a slight limp in right leg.
May 5, 1930. Went home.

Readmitted February 4, 1932, for treatment of visual impairment due to progressive optic atrophy. Blood Wassermann February 12, 1932, and February 19, 1932, negative. Lumbar puncture (spinal drainages the 12th since his initial hospitalization) February 24, 1932: serology of spinal fluid negative. Clinical record was uneventful except for four epileptiform seizures, nocturnal in type. Discharged June 29, 1933, improved.

CASE 2.—Male, negro, single, age 39, admitted January 24, 1934, for treatment of (1) bulbar paralysis; (2) hyperopia; (3) injury of left elbow. Patient was in a motor truck accident September 13, 1932, resulting in a fracture of left elbow and multiple lacerations of scalp. Blood Wassermann at this time was four plus. Patient subsequently had severe headaches at frequent intervals and in December, 1933, he began to show symptoms of failing vision in the right eye, deafness and difficulty in "eating."

Physical Examination.—On admission the patient was recumbent, weak, drowsy and apparently seriously ill. A purulent discharge partially occluded both external nares; saliva drooled from the mouth which remained open.

Neurological Examination.—Ptosis of right eyelid with chemosis of bulbar conjunctiva. Pupils widely dilated and fixed to light and accommodation, definite exophthalmia, ophthalmoplegia and cycloplegia. The left pupil was smaller than the right and reacted sluggishly to light and accommodation with rotations limited. Diplopia was present when the right eye was held open. Definite dysphagia, dysarthria and dysphonia were present with paralysis of the muscles of mastication. Taste was intact but there was a flaccid paralysis of tongue, pharynx and larynx and food would regurgitate through the nose. Sensation fairly accurate but findings unsatisfactory due to poor cooperation of the patient. Superficial reflexes were absent and deep reflexes exaggerated, most marked on the left, but no Babinski or clonus present.

January 24, 1934. Temperature 98, pulse 88, respiration 24. Blood pressure 120/110. Blood Wassermann negative. Kahn 2 plus. Modified Hinton positive. Lumbar puncture: Pressure on Queckenstedt test 350/140, fluid clear, of globulin a trace, 26 cells, Wassermann negative, Lange colloidal gold curve 0112210000. RBC. 5,550,000, WBC. 7700; hemoglobin 75 per cent.

At short intervals the patient became mentally clear and conscious and replied relevantly and coherently to questions. Forced alimentation was necessary and his condition became progressively weaker. He died February 1, 1934. Autopsy revealed: (1) Broncho-pneumonia, hypostatic, (2) myocardial degeneration, (3) chronic interstitial nephritis, and (4) old fracture of the left arm.

The calvarium was thin. All meningeal and cerebral vessels were markedly thickened. Meninges were thickened throughout. No gross changes were observed in cortex or white substance. The pons and the entire medulla were covered by a very thick smooth psuedo-membrane, firmly adherent to underlying tissues which in the pons appeared atrophied and enveloped all

cranial nerves. Over the medulla a portion of the thickened membrane was loose and could be easily removed. The membrane was 6 mm. thick and had the macroscopic appearance of dura mater. For this reason a provisional diagnosis of a pachymeningitis, probably syphilitic, was made. Microscopic studies, however, revealed the thickened membrane to be the pia, immensely infiltrated mainly with lymphocytes and plasma cells (both types degenerated) and containing numerous blood vessels. The walls of the latter also exhibited marked infiltrations which were usually merged with those of the surrounding tissues and were sometimes so dense that they resembled gummata. The lumina were usually patent and not narrowed as endarteritic phenomena were absent.

The pia was infiltrated and thickened over the pons and medulla. On the dorso-lateral surface of the medulla at its lowest level there was a remarkable outgrowth of neuroglia into the meninges so that the superficial zone was formed into areas of neuroglia intersected and penetrated by collagen fibers. There was also in this region, especially near the median raphé, considerable overgrowth of connective tissue round the vessel walls, the new fibers being chiefly arranged parallel to the vessel walls, but short radial fibers also extended from them into the nervous tissue.

Infiltration similar to those just described also invaded the cranial nerves in which they involved the epineurium and perineurium.

In contrast to the marked vascular changes, parenchymatous cell changes were scarce; the ganglion cells showed occasional chromatolysis, and the stroma appeared rarefied or edematous. No changes were noted in and around the spinal cord.

Diagnosis.—Subacute leptomeningo-encephalitis of the pons and medulla (luetic).

The author wishes to express his appreciation to Dr. G. B. Hassin of Chicago, Ill., for the preparation of the histopathologic sections.

Conclusions.

1. Early headaches, later vertigo with periodic loss of consciousness with a hyperpyrexia of short duration, stupors separated by intervals of full consciousness, an associated bulbar paralysis, paralysis of the cranial nerves especially ophthalmoplegia and commonly papillœdema and with consecutive optic atrophy are the accompaniments of a sub-acute or hypertrophic luetic leptomeningitis. The symptoms are usually of moderate degree and disappear as a rule under treatment but may confuse the diagnosis.

2. Complete serological studies of the blood and cerebrospinal fluid are essential in sub-acute nervous diseases accompanied by choked discs.

FIG. 1.—Third Cranial Nerve—Lymphocytic and Vascular Congestion of Epineurium and Perineurium. Van Gieson's Stain—L. P.

FIG. 2.—Hypertrophic Leptomeninges (Pia)—Marked Perivascular Infiltration. Blood Vessel Lumina Patent and Not Narrowed, Endarteritic Phenomena Absent. Van Gieson's Stain—H. P.

Patent and Not Narrowed, Endarteritic Phenomena Absent. Van Gieson's Stain—H. P.

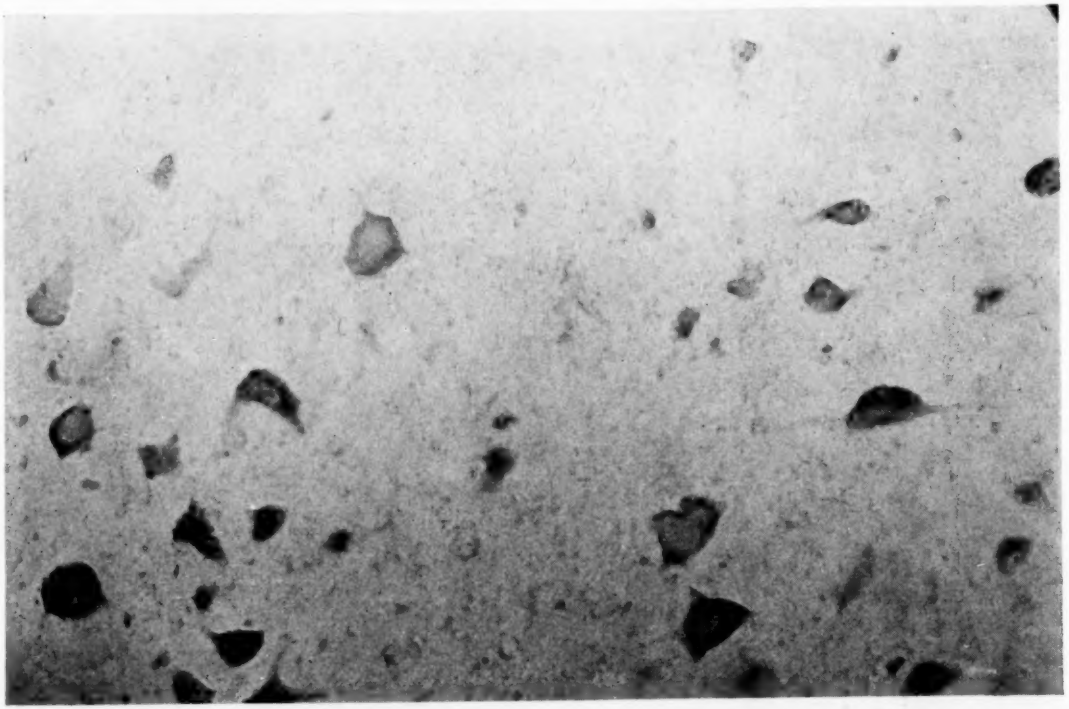

FIG. 3.—Pons—Ganglion Cell Chromatolysis. Toluidin Blue Stain—L. P.

FIG. 4.—Pons—Ganglion Cell Chromatolysis—Glia Rarefied and Œdematous. Toluidin Blue Stain—H. P.

3. Hypertrophic leptomeningitis believed to be rare and always secondary to trauma or acute non-luetic cerebrospinal meningitis, may be of luetic origin. It is characterized by a productive inflammation, a marked connective tissue proliferation and lymphocytic infiltration and results in a thickening and opacity of the pia and arachnoid or in the formation of a psuedo-membrane enveloping the pons, medulla and cranial nerves.

4. In contrast to the marked vascular changes, parenchymatous cell changes are infrequent. The ganglion cells show occasional chromatolysis and the stroma appears rarefied and œdematous. No changes are noted in or around the cord.

5. In spite of the wide dissemination of syphilis of the nervous system, symptoms of a sub-acute luetic leptomeningo-encephalitis, of the pons and medulla are infrequent.

FIG. 4.—Pons—Ganglion Cell Chromatolysis—Glia Rarefied and Œdematous. Toluidin Blue Stain—H. P.

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DISCUSSION.

DR. WALTER L. BRUETSCH (Indianapolis, Ind.).—Dr. Smith has emphasized that in spite of the frequent involvement of the meninges by syphilis a hypertrophic luetic leptomeningitis is rare. I can fully confirm this statement. In older textbooks particularly of French origin one sees occasionally an artist's drawing (not a photograph) of a brain having small greyish gummatous

nodules in the pia-arachnoid; a picture which is described as gummatous meningitis. I have been looking in vain for such a brain for the past 10 years. We have, however, two brains in the Indianapolis collection which answer the clinical as well as the anatomical picture of a hypertrophic luetic lepto-meningitis. One brain is from a colored patient, who developed Jacksonian attacks, had a one-sided ptosis, a unilateral atrophy, and marked memory defects. The serology was paretic in type. The other brain is from a child with congenital lues who was brought to the Childrens' Hospital of the University with history of convulsions, failing vision, and general weakness. In both instances the dura, arachnoid and pia over one hemisphere were one thick membrane. Microscopic examination revealed that the process started in the pia-arachnoid by proliferation of a large number of fibroblasts being intermingled with lymphocytes, plasma cells, and histiocytes forming a dense tissue and growing into the inner layer of the dura. How rarely a hypertrophic luetic leptomeningitis is observed in mental hospitals is brought out by the fact that in over 500 autopsies of neurosyphilitic patients we had only a single case at the Central State Hospital of Indianapolis.

Dr. William Malamud (University of Iowa, Iowa City, Iowa).—This is an interesting and valuable investigation. I had an opportunity to study the slides some time ago, and I thought of the relationship between this picture and the one we find in the Heubner type of endarteritis.

It is interesting to note that in both of these conditions the marked inflammatory reaction of the meninges seems in a way to prevent the destruction of the brain itself. As I examined the tissues I found that there were very few changes in the cortical cells.

Dr. Alan P. Smith (Veterans' Administration Facility Tuskegee, Ala.).—I wish to thank Dr. Breutsch and Dr. Malamud for their discussions. In reply to Dr. Breutsch's question, all of the cases presented are institutional patients, and their histories and clinical records are available.

BRAIN POTENTIAL RHYTHMS IN A CASE SHOWING SELF-INDUCED APPARENT TRANCE STATES.

By M. M. THOMSON, M. D., T. W. FORBES, Ph. D., and M. MARJORIE BOLLES,

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There have been reports of electrencephalographic studies on man in various physiological states by many investigators. We are reporting in this note brain rhythms obtained through the cooperation of an individual subject to migraine and having the ability to induce voluntarily light trance states. Records were obtained before, during and after trance. As indicated below, events during the "trance" might or might not be remembered.

The trance was usually preceded by a period in which the subject appeared drowsy. During the trance the subject habitually sat with neck muscles relaxed and head leaning against the high back of a chair in a somewhat darkened room. In this posture he asked and answered questions in three or four different assumed personalities accompanied by a certain amount of gesticulation. It was found possible after the subject became used to the experimental situation to modify his routine so that the trance was induced while lying relaxed on a couch thus eliminating to a large extent any possible electrical disturbance from muscular activity, with the exception of talking. The post-trance period was characterized by a mild lethargy and a slightly sleepy appearance.

The subject usually reported drowsiness and generalized cranial sensations for an hour or two before the trance, maintaining that he often was unconscious of what had occurred but that he sometimes remembered to a greater or a less degree the conversation during the apparent trance. Subsequent to the trance he reported drowsiness and feeling as if suddenly awakened from a deep sleep.

We obtained successive records from active midline electrodes on vertex and high frontal (hair line) locations, the inactive electrodes being over the mastoid process on each side. Apparatus for simultaneous recording was not at hand. Electrodes were rubber cups with platinum and Cambridge electrode jelly, attached with collodion. Recording was by capacity coupled amplifier (time constant 1 second) and string galvanometer.

In the relaxed posture the subject appeared to doze preceding the trance and records showed bursts of alpha waves somewhat similar

to those reported by Loomis during sleep. In the period intervening between dozing and the onset of the trance bursts of a 50-cycle frequency occurred spasmodically for durations of one to two seconds at about 30 microvolts intensity which may have been connected with muscular responses. Slower waves of the same amplitude at 2 to 2.5 per second also occurred here. During one experiment the subject appeared to go into a sleep state instead of waking following the initial trance and this sleep was followed by a second trance state similar to the first. The electrical records showed bursts of alpha waves after the first trance state followed by quiescence and a marked return of the alpha waves at the start of the second trance.

Rather continuous alpha waves (approaching 100 per cent) occurred during the trance, were at times interrupted and at other times uninterrupted by the activity involved in talking and listening. In pre- and post-trance records the alpha rhythms occurred only from 10 to 50 per cent of the time while lying in the dark with eyes closed and attempting to relax. The amplitude of the alpha waves was approximately 10 microvolts and their frequency from 9.5 to 11.0 per second.

This individual has been subject to migraine and is of nervous temperament. His intelligence and cooperation are indicated by his frank report as to events during the trance as noted above. Since it is difficult to assemble a large number of cases of this type it is felt that this note on a single case is justified for its suggestive value. The results seem to indicate that something similar to a light sleep state is involved in this individual's "trance," as shown by the entrance of more frequent alpha waves during trance as contrasted to the burst character of alpha rhythm in the preceding doze and the lower frequency of alpha waves when attempting to relax in a normal state. The proneness to sleep when a relaxed posture was used is suggestive corroboratory evidence.

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THE RESPONSE OF PSYCHONEUROTICS TO VARIATIONS IN OXYGEN TENSION.*

By R. A. McFARLAND, Ph. D., and A. L. BARACH, M. D.

In the analysis of psychoneurotic behavior increased attention is being given to the various ways in which emotional and environmental stimuli may disturb the body equilibrium. Cannon's [7] emergency theory of emotions has accounted for some of the physiological changes associated with fear, rage and pain. More recently he has discussed the rôle of the sympatho-adrenal system in the maintenance of "homeostasis" or in the so-called "steady state" of the fluid matrix.[8, 9] The correlation of psychic and somatic disorders is becoming increasingly clarified as illustrated in the recent reviews of Dunbar,[10] and Fetterman.[11] The psychoneurotic, because of precipitating emotional disturbances, *i. e.*, fears, anxiety, insecurity, and also because of certain biological inadequacies, is constantly involved in a struggle to maintain equilibrium.

One of the most sensitive and direct tests in studying the homeostasis of psychoneurotics would be to compare their reactions to variations in oxygen tension with those of normal subjects. A deficiency of oxygen has marked effects on behavior since all the tissues of the body, especially the nervous tissue, are extremely sensitive to anoxia. There is no storage of oxygen in the organism, unless the splenic reservoir be considered such. Under diminished oxygen tensions, however, adjustments take place immediately to provide sufficient oxygen to burn the nonvolatile acid which is constantly being produced by the cells. The pulmonary ventilation is increased, the bronchioles are dilated, the heart beats more rapidly, the arterial pressure is raised and an increased number of cor-

* This research was carried out at the New York State Psychiatric Institute and Hospital. The authors are indebted to the medical, nursing and psychological staff for their cooperation. The study was made possible by a grant from the Council on Research in the Social Sciences of Columbia University and through the courtesy of The Linde Air Products Company, which donated the gases, oxygen and nitrogen, used in the research.

From the Department of Psychology, Columbia University and Department of Medicine, College of Physicians and Surgeons, Columbia University.

puscles are forced into circulation by the contraction of the spleen. All of these reactions are affected by sympatho-adrenal functioning. The question, therefore, arises as to whether this system may not become impaired in the psychoneurotic, under continual emotional stress, resulting in a chronic condition of impaired oxygen transport or utilization.

Animal experiments have demonstrated the importance of the sympathetic nervous system in adapting to anoxia. Kellaway [21] observed increased activity of the sympathetic system in cats, rabbits and goats during exposure to lack of oxygen. Izquierdo [19] reported similar observations in cats. Cannon [7] found that sympathectomized cats collapsed when subjected to extreme variations in temperature, exercise or intense emotional situations. More recently, however, Brouha, Cannon and Dill [6] have shown that these adjustments take place in dogs via other mechanisms. Sawyer, Schlossberg and Bright [30] reported that sympathectomized cats collapsed quickly during anoxia, such as could be tolerated by normal animals over an hour with no obvious discomfort other than more rapid breathing. They observed, however, that if a normal cat became excited during the experiment its ability to tolerate oxygen deprivation was remarkably lessened.

During the Great War a group of investigators devised tests for determining the fitness of pilots to fly at high altitudes.[17] Each pilot was required to attend simultaneously to three psychological tests involving visual, auditory and motor responses while rebreathing a certain amount of air which decreased in oxygen percentage from 21 to 6 within one-half hour. Schneider [32] observed that the subjects varied either in the direction of fainting or failure of task performance, especially the emotionally unstable and chronically "fatigued" ones. In most cases physiological unfitness was accompanied by definite psychoneurotic traits. The relationship between the symptoms observed in the pilots, such as shallow breathing, dyspnea, cyanosis and neurocirculatory failure, to chronic fatigue and neurasthenia and poor reactions to anoxia has been discussed by McFarland.[24]

Recently Armstrong [1] reported a study of 163 unselected aeroplane pilots with chronic functional nervous disorder termed "aeroneurosis." The pathogenesis consisted of long continued and profound emotional stress related to fear of accidents, economic and

social insecurity, and possibly nerve tissue destruction producing general irritability, gastric neuroses, insomnia, sensory and motor hyper-activity and a deterioration of the higher nervous centers. This study serves as an excellent illustration of psycho-somatic relationships in mental disorder.

Haldane [13, 14] reported that a common and prominent symptom of war patients designated as "shell shock," "soldiers' heart" and "neurasthenia" was shortness of breath on exertion, rapid and shallow breathing with a sense of impending suffocation, indicating failure of the respiratory centers. There were also general nervous irritability, exaggeration of circulatory reflexes, sweating and instability of temperature. These cases led Haldane to suggest that military neurasthenia was only a more lasting and persistent form of ordinary fatigue and exhaustion due to oxygen want. Barcroft, Hunt and Dufton [5] found that patients with "chronic" gas poisoning who showed many psychoneurotic tendencies were greatly improved after residence for one week in a chamber with 50 per cent oxygen.

It has been unwarrantedly assumed by some that if the oxygen tension of the air reaching the lung alveoli is normal, anoxemia does not develop, irrespective of the type of breathing, *i. e.*, whether it is deep or shallow, slow or rapid. Haldane, Meakins and Priestly [15] devised an apparatus for use with normal subjects so as to artificially limit the depth of breathing. If the restriction was only moderate, compensation was manifested by increased frequency, but in most persons the breathing soon became periodic with subjective symptoms of headache and depression as observed in anoxia. Starr [35] found in studying fatigue, stammering, excitability and other emotional abnormalities in children that many were sub-breathers and were overloaded with carbon dioxide. The psychoneurotic, through a long period of continued emotional strain, may, therefore, develop inadequate respiratory habits.

It is interesting to follow the psychological changes in clinical cases where there is a known deficit of arterial oxygen saturation due to a mechanical hindrance in the diffusion of gases such as in congestive heart failure, pulmonary fibrosis or emphysema. Irrationality, depression and marked impairment of judgment are common, with occasional delusions and hallucinations. Barach [2] has observed striking mental changes in patients with cardiac disease

and pulmonary emphysema who had suffered from long-continued anoxemia when they were first treated with oxygen. A case of advanced emphysema, with an arterial oxygen saturation of 52 per cent, became irrational, excited and difficult to control one hour after he was put in an oxygen tent. After four days of the treatment he became calm, rational and cheerful. The adaptation to chronic oxygen want is apparently made at a lowered level of mental and emotional activity. When this is changed, and the patient's blood suddenly brought to the normal oxygen saturation, the previous adaptation is done away with, and stupor, sleep or irrationality may appear, although only for a temporary period of one to six days. The subsequent period of adjustment to normal oxygen saturation of the blood is accompanied by complete rationality and by a greater feeling of well-being and cheerfulness than was present prior to treatment.

In stagnant anoxia, where the circulation is so retarded that the oxygen is not transported rapidly enough to maintain the optimum oxygen tension in the tissues, as in the case of extremely low arterial pressure, increased venous back pressure, contracted arterioles due to cold, disturbances of the sympathetic nervous system, cardiac failure and shock, there are frequently marked psychological changes. Levy [23] has enumerated some of these symptoms in advanced cardiac failure. One of the early signs of cerebral anemia is a constant sense of exhaustion following slight exertion, with muscular weakness and a tendency to fatigue. Mental effort is difficult or impossible and memory is impaired, especially for recent events. Sleeplessness and disturbing dreams at night are frequent, also hallucinations and derangement of special senses, as well as extreme depression or abnormal mental states of suspicion and despair. McFarland and Huddleson [27] have reported a significant degree of functional unfitness in the circulatory system of large groups of psychoneurotic and psychotic patients.

These psychological changes are also pronounced in clinical cases of anemia where there is a lack of hemoglobin (anemic anoxia) or in carbon monoxide poisoning when the oxygen carriers are inactivated. The deficiency of functioning hemoglobin is partially compensated for by increased circulation but chiefly by adaptation to lower cellular oxygen tension during the gradual development of anemia, as in acclimatization to high altitudes.

In carbon monoxide poisoning the anoxia is usually produced more suddenly and the effects, physiological and psychological, are very striking since carbon monoxide has an affinity for hemoglobin, estimated to be 300 times greater than oxygen.[28] The red cells can no longer perform their normal function as oxygen carriers. There is frequently exhilaration and cerebral excitement due to stimulation of the central nervous system and possible "emergency reactions" via the sympathetic system. A frontal headache is usually noticeable, attended with increased pulse and blood pressure and roaring in the ears. General weakness, dizziness, yawning and nausea soon appear with dimness of vision, dilated pupils and conjunctivitis. Loss of muscular control follows with tremors and muscular twitchings, palpitation, shortness of breath and pains in the chest. Mental confusion is especially noticeable with progressive anoxia and the intellect is dulled without the person's awareness of it. Ability to think clearly is diminished and there is failure of judgment and memory. There are frequently uncontrolled emotional outbursts of hilarity or pugnacity or changes of mood accompanied by singing, laughing or crying for no apparent reason. There may be definite mania, hysteria, hallucinations and delirium.

The effects of cyanide, alcohol and certain other narcotics are cited by Peters and Van Slyke [28] as representative of histotoxic anoxia where there is some unknown interference with the functioning of tissue respiration. The well known psychological alterations in alcoholism are of interest here since oxygen deprivation produces symptoms similar to alcoholic intoxication. Barcroft [4] and Haldane [13] during their studies of anoxemia in chambers and at high altitudes have frequently mentioned the similarities of a person suffering from oxygen want and of alcoholic stupor or excitement. Barcroft suggested that "acute oxygen want simulates drunkenness, while chronic anoxemia simulates fatigue."

McFarland and Barach [25] have studied the extent to which alcoholic intoxication can be counteracted by excess oxygen and carbon dioxide as measured by the amount of blood alcohol, lactic acid, and by psychological tests. Following the ingestion of alcohol, 20 out of 25 human subjects showed significant improvement in 50 per cent oxygen and 2 to 5 per cent carbon dioxide. The blood alcohol and lactic acid were significantly lowered in 1 to 2 hours, varying in degree with the amount of alcohol ingested and the in-

dividual subject. The improvement was very striking in four subjects who had basal metabolic rates below −20.

The psychological changes which occur in clinical cases with well-established symptoms of anoxia are easily reproduced in normal persons when deprived of oxygen. McFarland [24] has observed that the most characteristic symptoms of anoxia in balloonists, aviators, mountaineers and in subjects exposed to rebreathing and chamber experiments are: deficient orientation in finer movements, motor unrest, loss of self-control, impaired judgment and memory, indecision, sleepiness, perseveration and reiteration, heightened emotional reactions, depression, indifference and apprehensiveness. All of these symptoms are commonly observed in psychoneurotic patients. In experiments with human subjects McFarland [24] carried the oxygen deprivation far enough to distort mental and emotional behavior and reveal certain reactions in character and personality, especially in those traits related to emotional conflicts.

Whether the cause be psychological or physiological it is well recognized that vegetative nervous disturbances are characteristic of the psychoneurotic, manifested especially by palpitations, digestive disturbances, respiratory disorders, vertigo and profuse sweating. Kroetz [22] has brought forward experimental evidence, as yet unconfirmed, substantiating the conception of Hess [16] that the oxygen exchange between the alveolar air and blood is promoted by sympathetic and inhibited by vagus action. In neurotic patients showing vasomotor instability and "vegetative stigmatization," Kroetz found the oxygen tension difference between alveolar air and arterial blood greater than normal, *i. e.*, from 6 to 31 mm. Hg, and a decrease in the average arterial oxygen saturation to 88 per cent. He observed that vagus sectioning increased the oxygen absorption, improved anoxemia if present, and through secretion of adrenalin increased the arterial oxygen saturation.

In summarizing the findings concerning anoxia, it becomes evident that patients suffering from oxygen want, such as occurs in cardiac insufficiency, neuro-circulatory failure, emphysema, pneumonia, carbon monoxide poisoning or acute alcoholism, simulate many of the characteristics of the psychoneurotic; that normal subjects when deprived of oxygen as in high altitudes, in rebreathing tests, in low oxygen chamber studies, lose to some extent their motor, mental and emotional control. It has also been reported that in-

dividuals under chronic emotional strain or patients with prolonged "vegetative stigmatization" frequently become shallow breathers and in some cases alter the tension equilibrium of the gases between the lungs and blood sufficiently to lower the arterial oxygen saturation. It seemed of interest, therefore, to analyse the reactions of psychoneurotics to high and low oxygen tensions with particular reference to patients with marked symptoms of fatigue and exhaustion.

Experimental Procedure.

Two groups of psychoneurotics, 14 females and 18 males, were compared with a group of normal subjects, 25 males (comparable in age, intelligence and physical fitness) in their response to a series of physiological and psychological tests while breathing various percentages of oxygen. There were two control sessions in air (21 per cent O_2); two of oxygen lack (12 per cent and 10 per cent O_2); and one of oxygen excess (50 per cent O_2). The first control in air served as a practise one to acquaint the subjects with the procedure. The 12 per cent O_2 series was given next; then 10 per cent O_2 if the effects of the former were not too severe. The 50 per cent O_2 series was fourth and the second control in air last.

Concentrations of 12 per cent and 10 per cent oxygen were used since these tensions are low enough to produce considerable stress. In the average person changes in respiration, pulse and blood pressure are first observable in from 16 to 14 per cent oxygen, corresponding roughly to the partial pressure of oxygen available at 7500 feet to 11,500 feet altitude, respectively; and there are few who are not affected markedly at from 12 to 10 per cent O_2 (15,500 to 20,000 feet). During the rebreathing or altitude tolerance tests on over 7000 pilots during the World War, most of them were brought to a point of collapse or impending collapse within 20-30 minutes; in many cases the partial pressure of oxygen was lowered to 7 or 6 per cent without serious after effects. The average person will faint or collapse before the "strain" becomes too great. We made certain, however, that no one took the tests who had a cardiac or pulmonary disorder.

The five experimental sessions for each subject were distributed at equal intervals over one month. All of the patients and control subjects were naive about the effects of anoxia. They were simply asked to take several tests in an "air conditioned" chamber.

The tests were administered individually, twice during each two-hour period so as to compare not only the absolute differences between individuals and groups but also the relative amount of acclimatization during the second hour.

The tests were given in a Barach [2] portable oxygen chamber (7 x 8 x 8 feet) where the gases, temperature, ventilation, and humidity could be regulated. The concentration of oxygen was maintained at the desired percentage by running in nitrogen to lower it and oxygen to raise it. The carbon dioxide never exceeded 1 per cent. The percentages of O_2 and CO_2 were checked on a simplified Haldane gas analysis apparatus every 20-30 minutes. The ventilation was provided by a motor blower unit in a room adjoining the one in which the chamber was placed. The air current was passed through a tank which contained ice to cool and dry the air. The temperature was maintained between 65-70° F., and the humidity between 40-50 per cent. The chamber was on a ward free from distractions and other outside influences. The experimenter was protected against the effects of anoxia by breathing additional amounts of oxygen through a nasal catheter. The small change in percentage of oxygen was compensated for by a small amount of nitrogen from a cylinder outside the chamber. The nasal catheter was worn in both the control and experimental sessions.

Subjects.—Thirty-two patients served in the experiment (14 female, 18 males); 22 from the wards and outpatient department of the Psychiatric Institute, and 10 from the clientele of psychiatrists practising outside the institution. The average age of the females was 29 years (range 17-40), of the males 27 years (range 17-42). An attempt was made to select patients in whom the various complaints of fatigue and exhaustion were prominent symptoms, both factors being related to possible neuro-circulatory unfitness or impaired oxidation. None of the patients, however, had any recognized organic disorder. The patients were (with 5 exceptions) in the early stages of their illness, the average time from the onset of the acute symptoms to the experimental study being 3.3 months (range 1-8 months).

The clinical diagnoses of the females were as follows: neurasthenia, 3; anxiety state, 4; simple depression, 3; psychasthenia, 2; anxiety hysteria, 2. Four months later the diagnoses of 3 patients were changed to manic depressive. The diagnoses of the male pa-

tients were as follows: neurasthenia, 4; anxiety state, 5; simple depression, 3; anxiety hysteria, 4; psychasthenia, 2. Within five months following the experiment 3 of the patients were diagnosed dementia præcox (simple) and one manic-depressive insanity.

Patients with a fairly high level of mental ability and cooperativeness were selected because of the degree of difficulty of the psychological tests. The mean score on the Army Alpha test was 141 (range 114-172) for the females and 154 (range 125-177) for the male patients. The educational status of the patients was as follows: 6 had from 2-4 years in high school, 10 were high school graduates, 12 had from 1-3 years of college training, and 4 were graduate students. The patients were, with three exceptions, students, business men, secretaries or technicians.

The control group of 25 males were of comparable age (mean, 25 years—range 19-36), habitus and fitness, but of slightly higher mental ability; the mean Army Alpha score was 160 (range 141-189). Most of them were students, technicians or business men. The patients and control subjects were of the same general physical conditions with the exception that the patients in the hospital were subject to more regular habits of diet, exercise and rest. None of the control subjects were athletes in training since athletic fitness might have aided in their adaptation to oxygen lack. Schneider [32] has shown, however, that ability to tolerate oxygen deprivation is related to factors other than vital capacity or physical training, such as the rate of diffusion of gases in the lungs, etc.

Description of Tests.

During each experimental period the following physiological and psychological tests were given: The *respiration, pulse* and *blood pressure* were recorded in a sitting posture three times during each experimental session; first, approximately from 5 to 10 minutes after the subject entered the chamber, and again, at the ends of the first and second hours. *Basal metabolism* determinations were made on all the subjects as well as certain *biochemical tests.*

The psychological tests, administered in the order named, were given twice during each experimental session: (1) *Choice Reaction* [34]—rapidity in pressing the corresponding key to one of five colored lights; the score is in hundredths of a second with the means based on 50 trials. (2) *Form Board* [12]—forms 4, 5 and 6 of Ferguson's series; the score is in seconds based on an average

of 3 trials. (3) *Mirror Drawing* [12]—the rapidity and accuracy in tracing with a stylus the outline of a star inverted by looking at it in a mirror; the score is based on time in seconds and number of contacts electrically recorded (average of 5 trials). (4) *Code* [20]—rapidity of transliterating as quickly as possible the letters of a code (20 different forms constructed by Johnson); the score is in seconds based on average of five forms. (5) *Wabble Meter* [18]—involving the maintenance of balance on a platform one foot square, the deviations being recorded automatically on two Veeder counters; the score is based on the average of three trials each of two minutes duration. (6) *Mental Test* [12]—parts 3 to 7 inclusive of the *army alpha* test were used (8 different forms). (7) *Guidit* [29]—the degree of neuro-muscular coordination and speed in guiding a steel ball up an inclined plane by circumventing holes and barriers with a slightly crooked rod set in a handle; the score, based upon the average of ten trials, is a function of the number of holes passed and time in seconds.

In addition to the objective tests the experimenter recorded any voluntary remarks from the patient as to how he felt and also made careful records of any unusual alteration in behavior, such as the degree of cyanosis, tremors, lethargy, distractibility, facial expression, emotional reactions and changes in mood.

Results of the Basal Metabolism and Biochemical Determinations.

The basal metabolism determinations were made with a Benedict-Roth apparatus. The results for all subjects have been summarized in Table I. At least two determinations were made on each subject. Of the 14 female psychoneurotics, 7 are within the so-called normal range of ±10, 6 are below −10. Of the 18 male control subjects 4 are below −10, 20 are within the normal range, and one above +10.

TABLE I.

Basal Metabolism Determinations.

	Female patients.			Male patients.			Control subjects.		
	No.	Percent.	Average.	No.	Percent.	Average.	No.	Percent.	Average.
Below −10.....	6	42.8	−15	9	50.0	−14	4	16.0	−17
Within ±10.....	7	50.0	..	6	33.3	..	20	80.0	..
Above +10.....	1	7.2	+13	3	16.6	+15	1	4.0	+11.5
Total Number.	14			18			25		

Table II shows the mean, range, S. D., and C. V. for the biochemical tests made on the two groups of patients. The mean red cell count for the female group was 4,200,000, for the male 4,900,000 per cu. mm. The white cell count for the female group was 6800, for the male 8500 per cu. mm. If 7000 to 10,000 is taken as the normal range of variation in white cell count, six of the female patients fell below and two above this limit, while two of the male patients were below 7000 and three above 10,000. The mean fasting blood sugar for the females was 84.0 and for the males 88.5 mg.

TABLE II.

BLOOD BIOCHEMICAL DETERMINATIONS FOR THE PATIENTS.

	Mean.		Range.		Standard deviation.		Coefficient of variability.	
	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.
Fasting blood sugar (mg. per 100 cc.)	84.0	88.5	74-120	78-123	37.9	30.9	38.0	35.0
R. B. C. (in thousands per cu. mm.)	4,200	4,900	3,700 to 4,800	4,200 to 5,800	56.9	96.1	13.4	19.3
W. B. C. (per cu. mm.)	6,800	8,500	4,000 to 14,000	6,000 to 15,000	41.5	81.9	6.1	9.6
Polynuclears (per cu. mm.)	66.2	62.0	50-80	41-84	9.6	10.2	14.5	16.5
Lymphocytes (per cu. mm.)	31.0	34.0	16-44	15-57	9.0	9.1	29.2	27.0
Urea nitrogen (mg. per 100 cc.)	...	13.5	...	9.1-27.1	...	2.9	...	21.4
Uric acid (mg. per 100 cc.)	...	3.1	...	2.0-4.8	...	0.46	...	14.8

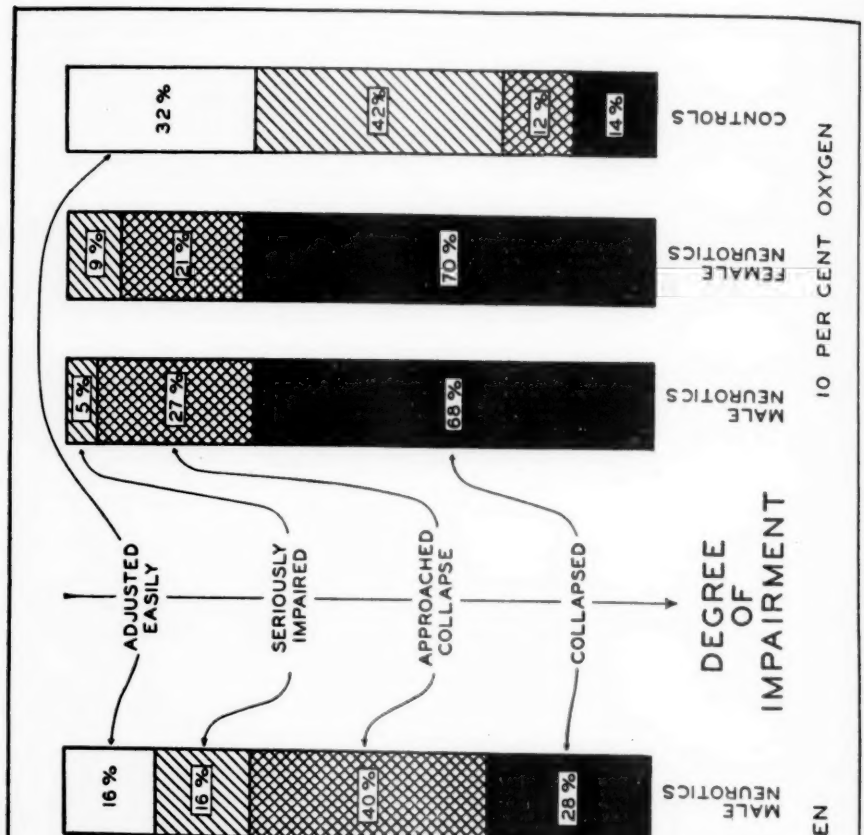
per 100 cc.; slightly lower than in average groups of normal subjects. The other biochemical determinations also show a greater range of variation than in comparable normal groups. With but a few exceptions, the determinations are sufficiently normal to be of no clinical significance.

SUMMARY OF INDIVIDUAL RESPONSES TO OXYGEN DEPRIVATION.

Each patient and control subject was rated on the degree of impairment in the 12 per cent and 10 per cent oxygen tensions on the following criteria:

(1) *Easily adjusted* or a high degree of acclimatization,

(2) *Serious impairment* but able to continue,


12 PER CENT OXYGEN
10 PER CENT OXYGEN
DEGREE OF IMPAIRMENT
ADJUSTED EASILY
SERIOUSLY IMPAIRED
APPROACHED COLLAPSE
COLLAPSED
CONTROLS
MALE NEUROTICS
FEMALE NEUROTICS
MALE NEUROTICS
FEMALE NEUROTICS
CONTROLS
81 %
12 %
7 %
14 %
36 %
29 %
21 %
16 %
16 %
40 %
28 %
5 %
27 %
68 %
9 %
21 %
70 %
32 %
42 %
12 %
14 %

(3) *Impending collapse* followed by removal or oxygen therapy,

(4) *Collapse* soon after entering the chamber, necessitating the administration of oxygen.

In Fig. 1 the response of each group to the diminished oxygen tension has been charted in terms of percentages. It is obvious that the patients were more severely affected than the normal subjects. Only a few of the controls were seriously impaired in 12 per cent oxygen while 28 per cent of the female and 21 per cent of the male patients collapsed or fainted soon after entering the chamber, a high percentage of the remaining patients being seriously impaired. In 10 per cent oxygen only 26 per cent of the control subjects were seriously impaired or collapsed, while 70 per cent of the females and 68 per cent of the males collapsed and were given oxygen inhalations to facilitate acclimatization or were removed from the chamber.

The subjective reports of physical complaints mentioned voluntarily by all of the subjects or observed by the experimenter were primarily headache, dizziness, nausea, palpitations, tremors, sweating, alterations in sensory functions especially vision, disorientation of parts of body and intense sleepiness and apathy. For the most part the patients tended to faint or collapse, exhibiting a sudden fall in pulse or blood pressure either after an initial sharp rise, or in many instances no rise at all. The normal subjects more frequently reacted with a controlled increase in pulse and blood pressure throughout, followed by a decrease. The severity of the circulatory responses closely paralleled the subjective symptoms. In the excess oxygen series (50 per cent O_2) many of the patients reported that they felt better, especially those suffering from headaches, tachycardia, hypertension, exhaustion and tremors.

The anoxia affected the control subjects by bringing out many neurotic traits while it appeared to accentuate the symptoms of the patients. The most common complaints from the clinical histories (in rank order) are shown below in relation to those due to the anoxia. The items were collected from the experimenter's notes, the spontaneous remarks of the subjects, and a rating scale of complaints scored by each subject at the end of the experiment and then ranked according to frequency of occurrence.

Clinical records.	In oxygen lack.		Control subjects.
	Female neurotics.	Male neurotics.	
Tired, exhausted.	Sleepy and tired.	Headache.	Sleepy (yawning).
General weakness.	Sweating or cold.	Dizziness and giddiness.	Headache.
Nausea, vomiting.	Tremors.	Sleepy and apathetic.	Dizziness and giddiness.
Bodily pains and disorders.	Great effort to move.	Sweating or cold.	Nausea.
	Pains in body.	Nervous tension.	Talkative.
Tremors.	Apathetic.	Tremors.	Tremors.
Nervous tension.	Headache.	Tired and fatigued.	Drunk.
Impairment of special senses.	Dizzy and giddy.	Impaired vision.	Restless.
	Impaired vision or hearing.	Nauseated.	Distractibility.
Headache.		Distractible.	Exerted great effort.
Insomnia.	Can't concentrate.	Great effort to move.	Happy or amused.
Vertigo.	Difficulty in breathing.	Pressure in head.	Sweating or cold.
Sweating or cold.	Faintness.	Difficulty in breathing.	Ears drumming.
Palpitations.	Laughter.	Pains in body.	Breathing alterations.
Choking sensations.	Irritable.	Drunk.	Depression.
Phobias, obsessions, compulsions.	Drunk.	Talkative.	Irritable.
	Talkative.		
Heightened nervous irritability.	Weeping.		
Inability to concentrate.			
Apathy and depression.			
Respiratory irregularities.			

Results of the Physiological Tests.

The means and standard deviations of the respiration, pulse and blood pressure for the three groups are given in Table III; the

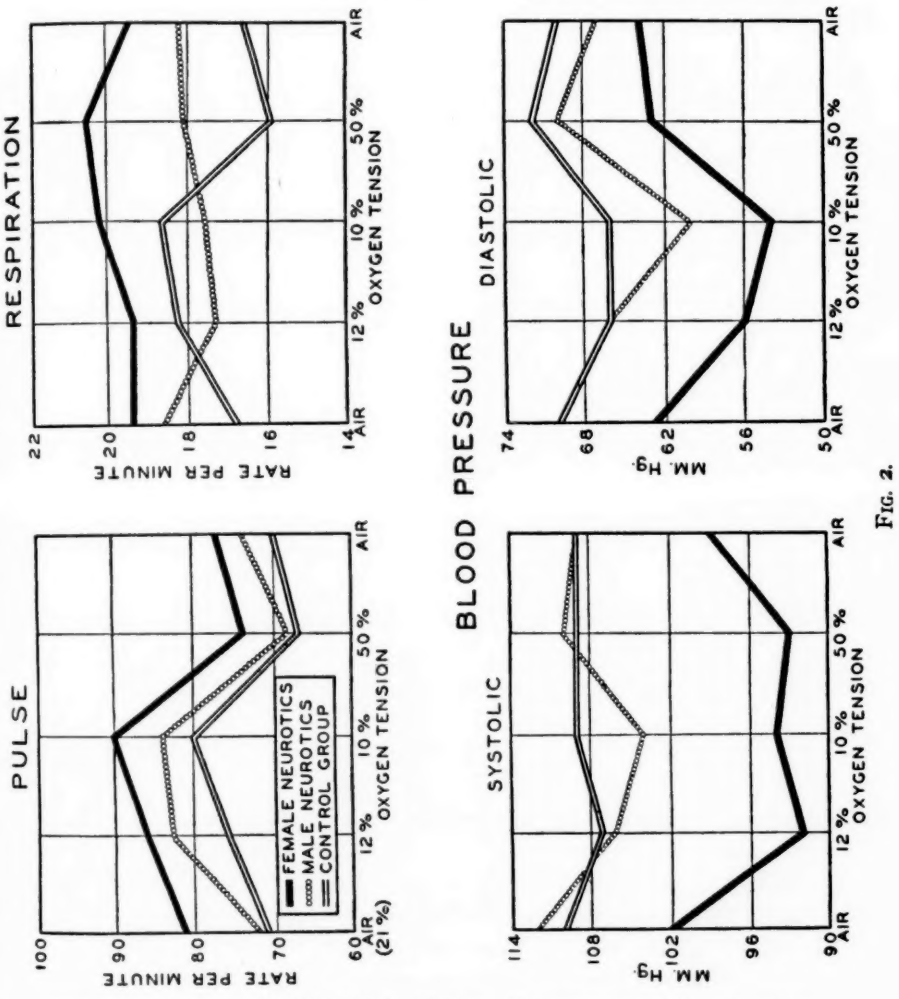


Fig. 2.

means are shown graphically in Fig. 2. The means are based upon the average of three records taken at the beginning of each session and at the end of the first and second hours. The average scores tend to conceal the extremely high and low reactions. These fluctua-

tions are revealed, however, in the increased variability (S. D.'s). The significance of the differences between the means and sigmas in the control as compared with the low oxygen sessions is shown in Table IV.

The average number of *respirations* per minute in the psychoneurotic groups in the various oxygen tensions is not greatly different from the controls. The variability, however, is increased. In

TABLE III.

PHYSIOLOGICAL TESTS.

Showing the means and standard deviations for each group in the various oxygen tensions.

	Respiration.			Pulse.			Blood pressure.		
	Male.	Female.	Control.	Male.	Female.	Control.	Male.	Female.	Control.
Air									
Mean.....	18.6	19.4	16.8	72.6	81.6	71.1	112/70	102/63	110/70
S. D.....	3.9	2.9	1.9	12.4	12.8	8.0	12.3/16.1	8.3/ 7.5	9.3/10.3
12 Percent O_2									
Mean.....	17.3	19.3	18.2	83.5	86.4	76.7	106/66	92/56	107/66
S. D.....	5.8	4.0	2.4	16.2	18.2	7.4	19.4/18.4	12.7/11.5	9.0/ 7.1
10 Percent O_2									
Mean.....	17.6	20.2	18.6	83.9	90.0	80.2	104/60	94/54	109/66
S. D.....	3.2	4.8	3.6	11.6	11.2	9.5	27.8/18.2	12.5/10.2	11.3/9.9
50 Percent O_2									
Mean.....	18.1	20.5	15.9	68.1	74.1	67.0	110/70	93/63	109/72
S. D.....	4.3	4.2	2.7	8.5	10.2	7.4	8.8/18.3	8.4/7.1	7.5/9.4
Air									
Mean.....	18.2	19.5	16.6	74.3	77.5	70.3	109/67	99/64	109/70
S. D.....	4.4	3.2	1.8	10.3	10.9	7.3	11.9/13.0	9.4/7.3	6.8/9.7

the control group there is a significant increase in rate of respiration between air and 10 per cent O_2 and between air and 12 per cent O_2.

The increase in *pulse rate* in low oxygen (also decrease in excess oxygen) is reliable for all three groups. The relative changes in the means of the patients, however, are greater than in the control group; also the variability is greater. The average pulse rate was slower in the normal subjects throughout the series, the best subjects usually showing a moderate rise followed by a gradual retardation to the normal. The patients frequently reacted to the oxygen

lack by an extremely rapid pulse rate, followed by a sudden fall previous to fainting or collapse. The poor acclimatization of the patients was manifested by too great an increase in pulse rate, by no response at all, or by a marked drop.

TABLE IV.

SIGNIFICANCE OF DIFFERENCES BETWEEN THE MEANS AND STANDARD DEVIATIONS.

Chances in 100 that the true difference (differences between the true measures) is greater than zero for the means and standard deviations of the male and female psychoneurotic and control groups in the various tests and oxygen mixtures.

	Respiration.	Pulse.	Blood pressure (sys.).	Blood pressure (dias.).	Choice reaction	Mirror drawing.	Guidit.	Wabble meter.	Form board.	Code test.	Army alpha.
Air and 12 Percent O_2											
Male Means.....	88	100	96	84	96	98	100	82	98	92	82
Male S. D.....	99	96	100	79	84	84	76	79	100	88	99
Female Means...	54	92	100	99	100	86	98	88	97	65	100
Female S. D.....	96	98	99	99	92	99	76	84	92	88	92
Control Means...	100	100	92	99	90	82	100	86	100	76	84
Control S. D.....	92	69	58	99	50	65	86	86	93	84	97
Air and 10 Percent O_2											
Male Means.....	88	100	90	99	99	62	99	73	92	96	98
Male S. D.....	86	65	100	73	96	84	58	76	86	100	96
Female Means...	65	99	99	100	99	86	99	97	100	100	100
Female S. D.....	98	73	96	90	96	73	92	54	92	58	97
Control Means...	100	100	73	99	86	93	99	99	98	76	100
Control S. D.....	100	93	96	62	62	76	65	99	100	79	76

The differences between the means of the *systolic and diastolic blood pressures* in air compared with low oxygen were completely reliable for the female patients and fairly reliable for the other groups. (Table IV, Fig. 2.) The changes in blood pressure in the patients were more extreme, in most cases, than in the control subjects; the change in systolic pressure was usually an initial increase followed by a fall previous to fainting or collapse.

The group variability of response in the physiological tests was greater on the average for the psychoneurotics than for the controls. This may be observed by comparing the *standard deviations* of each group in Table III, and the critical ratios between the S. D.'s

in air and low oxygen in Table IV. Although several of these changes do not show statistical reliability, there is a definite trend toward greater variability; in 75 per cent of the cases the S. D.'s increased from air to 12 per cent and 10 per cent O_2.

Table V shows the changes in pulse, and blood pressure during the second hour in terms of percentages of possible number of changes; that is, the number of changes in response in any one direction (increase; decrease, or no change) was divided by the

TABLE V.

CHANGES IN PULSE AND BLOOD PRESSURE DURING SECOND HOUR.

Written as Percentages of Possible Number of Changes in These Functions.)

	O_2 lack.				O_2 excess.				Air.			
	Per cent increase.	Per cent decrease.	Per cent no change.	Number of possible changes.	Per cent increase.	Per cent decrease.	Per cent no change.	Number of possible changes.	Per cent increase.	Per cent decrease.	Per cent no change.	Number of possible changes.
Female Neurotics....	22	74	4	58	64	23	13	34	43	29	28	52
Male neurotics.	28	61	11	72	47	33	20	48	22	36	42	62
Total neurotics.	27	67	6	130	54	29	71	82	37	33	30	114
Control Subjects.....	26	30	44	112	28	19	53	75	16	19	65	75

possible number of changes. More than 4 beats up or down in pulse rate or 6 mm. Hg in blood pressure was arbitrarily considered a significant variation. In the low oxygen tensions a larger per cent of the patients showed a sudden rise or fall in pulse and systolic and diastolic blood pressure. This indicated failure to acclimatize since a very rapid increase or decrease in pulse and a fall in blood pressure usually preceded or accompanied collapse.

RESULTS OF THE PSYCHOLOGICAL TESTS OF MOTOR FUNCTION.

The effect of the variations in oxygen tension on the tests of motor function may be observed by comparing the means and S. D.'s of each group in Table VI; the means for the *choice reaction* test are shown graphically in Fig. 3.

FORM BOARD
SECONDS
240
200
160
120
80
40
AIR
12%
10%
50%
AIR
OXYGEN TENSION
CHOICE REACTION
HUNDREDTHS OF SECONDS
90
75
60
45
30
15
0
(21%) AIR
12%
10%
50%
AIR
OXYGEN TENSION
FEMALE NEUROTICS
MALE NEUROTICS
CONTROL GROUP
MENTAL TEST
SCORE
180
150
120
90
60
30
0
AIR
12%
10%
50%
AIR
OXYGEN TENSION

FIG. 3.

TABLE VI.

PSYCHOLOGICAL TESTS OF MOTOR FUNCTION.

Showing the means and standard deviations for each group in the various oxygen tensions.

	Choice reaction (hundreds of seconds).			Mirror drawing (combined errors and time).			Guidit (score and time).						Wabble meter (No. contacts in 2 minutes).		
	Male.	Female.	Control.	Male.	Female.	Control.	Male.		Female.		Control.		Male.	Female.	Control.
							S	T	S	T	S	T			
Air															
Mean	47	53	39	57	76	49	13	44	9	16	12	17	72	77	37
S. D.	8	7	6	14	34	14	3	6	4	7	4	8	25	35	8
Errors	1.4	1.0	0.4	..	..	..	..	..	..	..	..	..	..	..	..
*S. D.	5.9	6.5	3.3	..	..	..	..	..	..	..	..	..	..	..	..
12 Percent O_2															
Mean	52	62	41	68	95	50	8	18	5	15	9	16	80	95	40
S. D.	10	10	6	18	64	13	4	6	4	7	3	7	30	46	6
Errors	2.2	2.4	1.2	..	..	..	..	..	..	..	..	..	..	..	..
*S. D.	7.1	9.4	5.0	..	..	..	..	..	..	..	..	..	..	..	..
10 Percent O_2															
Mean	57	64	41	77	93	53	9	18	5	16	10	18	72	109	46
S. D.	13	13	7	19	41	17	3	6	3	10	4	5	21	34	15
Errors	3.7	3.5	1.7	..	..	..	..	..	..	..	..	..	..	..	..
*S. D.	10.6	9.2	5.1	..	..	..	..	..	..	..	..	..	..	..	..
50 Percent O_2															
Mean	48	52	37	57	57	44	15	18	11	17	14	12	84	90	55
S. D.	10	7	6	13	23	9	4	7	6	6	4	4	27	21	13
Errors	1.6	0.9	1.1	..	..	..	..	..	..	..	..	..	..	..	..
*S. D.	4.3	4.4	3.5	..	..	..	..	..	..	..	..	..	..	..	..
Air															
Mean	47	59	37	56	64	44	14	18	9	16	13	11	84	98	40
S. D.	10	8	5	13	34	10	3	8	5	6	3	5	28	27	6
Errors	1.2	1.7	0.8	..	..	..	..	..	..	..	..	..	..	..	..
*S. D.	5.6	6.6	3.8	..	..	..	..	..	..	..	..	..	..	..	..

* In the choice reaction test the second S. D. represents the means of the individual standard deviations.

The relative effect of the low oxygen on motor functions was greater in the patients than in the controls. In the *choice reaction* test, for example, the increase in reaction time (and errors or missed keys) in low oxygen compared with air was statistically reliable for the psychoneurotic groups but not for the control group. The *guidit* test showed completely reliable changes for all three groups while the *mirror drawing* and *wabble meter* showed consistent although not always statistically reliable impairment for all groups in low oxygen. The effect of the anoxia was very noticeable in these tests because of the frequency of hand tremors and loss of motor control for finer movements. Many of the patients were too dizzy in the low O_2 series to stand on the wabble meter which defeated the purpose of the test and hence gave unreliable results.

The group variability in the motor tests was consistently greater for the patients than for the control subjects under all conditions, and the relative variability under O_2 lack was greater for the patients. In the *choice reaction* test the individual variability (average of individual sigmas) was consistently greater in the patients compared with the control subjects under the various control and low oxygen series.

Results of Psychological Tests of Mental Function.

The means and S. D.'s for each group in the tests of mental function are shown in Table VII; the means for the *form board* and *army alpha* (mental test) are shown graphically in Fig. 3. The differences between the means in air compared with 12 per cent and 10 per cent oxygen are reliable for all three groups in the *form board* test, and for the patients in the *code* and the *army alpha* tests in 10 per cent oxygen. The relative effects of the anoxia on mental functions also was consistently greater in the psychoneurotic groups compared with the control groups.

The group variability increased consistently in the low oxygen series compared to air in all three groups. The increase in the sigmas (S. D.'s) were fairly reliable statistically for all groups; however, in most cases the patients showed more reliable changes in variability in low O_2 compared with the controls.

As indicated previously, the tests were repeated during the second hour of each experimental session. Table VIII shows the changes in the motor and mental tests during the second hour in terms of

TABLE VII.

PSYCHOLOGICAL TESTS OF MENTAL FUNCTION.

Showing the means and standard deviations for each group in the various oxygen tensions.

	Form board (time in seconds).			Code test (time in seconds).			Army Alpha.		
	Male.	Female.	Control.	Male.	Female.	Control.	Male.	Female.	Control.
Air									
Mean.....	125	175	99	149	166	127	98	92	117
S. D.....	30	53	16	35	57	20	17	15	7
Errors.....	..	..	..	2.7	2.9	1.9	..	..	..
12 Percent O_2									
Mean.....	159	230	121	167	178	135	91	73	115
S. D.....	70	82	23	45	80	24	22	23	11
Errors.....	..	..	..	3.9	9.1	2.7	..	..	..
10 Percent O_2									
Mean.....	145	211	115	197	193	134	89	71	111
S. D.....	41	84	35	77	60	23	14	13	8
Errors.....	..	..	..	5.3	9.7	2.2	..	..	..
50 Percent O_2									
Mean.....	115	159	94	147	149	123	108	94	121
S. D.....	25	36	22	35	57	19	19	20	6
Errors.....	..	..	..	2.4	2.8	1.8	..	..	..
Air									
Mean.....	120	154	93	148	154	123	106	91	119
S. D.....	47	34	21	42	56	22	13	16	7
Errors.....	..	..	..	2.1	3.1	1.8	..	..	..

TABLE VIII.

CHANGES IN PSYCHOLOGICAL FUNCTIONS DURING SECOND HOUR.

(Written as Percentages of Possible Number of Changes in These Functions.)

	O_2 lack.				O_2 excess.				Air.			
	Per cent improved.	Per cent deter.	Per cent no change.	Number of possible changes.	Per cent improved.	Per cent deter.	Per cent no change.	Number of possible changes.	Per cent improved.	Per cent deter.	Per cent no change.	Number of possible changes.
Female Neurotics....	26	66	8	135	60	22	18	90	42	30	28	97
Male neurotics.	23	70	7	180	61	23	16	110	41	30	29	129
Total neurotics.	24	68	8	315	61	22	17	200	42	30	28	226
Control Subjects.....	59	19	22	176	52	24	24	84	50	22	28	88

percentages; that is, the number of changes in any one direction (improvement, deterioration, no change) was divided by the total possible number of changes. The deficiency in physiological adaptation in the patients was paralleled by poorer psychological responses during the second hour of each session. The per cent of the patients who did worse under low oxygen was distinctly greater than of the controls. In the series with excess oxygen the patients showed a greater degree of improvement than the controls. The relative loss of efficiency was greater in the motor tests than in the mental tests in all three groups.

Discussion.

The fact that the psychoneurotic patients were unable to acclimatize to the low oxygen tensions as well as the controls indicates that they were more sensitive to diminished oxygen. This could hardly be accounted for on the basis of the biochemical determinations which, for the most part, were within the normal limits. The range and standard deviation for each individual and for the group were distinctly greater, however, indicating a degree of organic instability. In a recent summary of the blood chemistry of the psychoneuroses McFarland and Goldstein [26] have observed that the mean differences in blood findings between neurotics and normal subjects were insignificant but both the individual and group variability were distinctly greater. Psychoneurotics, through their constant emotional stress, may, therefore, develop *an unsteady organic state.*

In the basal metabolism tests there was a greater range and variability in the psychoneurotic group. An analysis of the individual respiratory curves from the basal metabolism tests for frequency and depth showed that the patients were on the average rapid and shallow breathers.

Just as Cannon's normal cats were more susceptible to oxygen lack when frightened (the sympathectomized cats collapsing in a short time in anoxia) so the psychoneurotic, under constant emotional stress, may develop an unfitness in oxygen transport or utilization. The theory of Hess, which implies that the oxygen exchange between the alveolar air and blood is promoted by sympathetic and inhibited by vagus action, was supported by evidence (as yet unconfirmed) from Kroetz who showed a lowered arterial

O_2 saturation in neurotic patients with " vegetative stigmatization." Schneider reported that " fatigued or stale " pilots with disturbances of the sympathetic nervous system collapsed more easily under low oxygen tension in the rebreathing test. In commercial aviation it is commonly recognized that " nervous " people acclimatize poorly to high altitude and are more susceptible to fainting and air sickness.

In analyzing the cardio-vascular responses of the psychoneurotics compared with the normals under oxygen lack an obvious unfitness was manifested. Many of the patients reacted by far more extreme deviations in pulse and blood pressure; a large per cent of the patients fainted or collapsed in 12 and 10 per cent O_2. The normal subjects, on the contrary, often responded with a well-controlled rise in pulse and blood pressure, gradually returning to a more normal level. This is in agreement with Schneider's observations on pilots in the rebreathing tests.

The neurotic, under continual emotional stress, may develop loss of circulatory adaptability to emergencies such as oxygen deprivation. This conception makes the chronic fatigue and exhaustion of these patients more intelligible. In a recent study of over 500 psychoneurotics with the Schneider index of neuro-circulatory efficiency, McFarland and Huddleson [27] observed, in most cases, functional unfitness in their cardio-vascular systems. The patients with neurasthenia and anxiety states, who complained of fatigue and exhaustion, rated lowest on the index.

A still more important factor may be related to Haldane's observation that cases of neurasthenia and shell shock often revealed shallow and rapid breathing; many of them showed obvious signs of oxygen want. The failure of oxygen to penetrate to the unventilated alveoli of the lungs would have a cumulative ill effect according to Haldane, and eventually lower the arterial O_2 saturation and impair the function of nervous venous tissues. The fact that so many of the psychoneurotic patients did not respond to the oxygen lack by increased rate and depth of breathing was indicative of a relatively insensitive respiratory center.

It is difficult to determine whether there is a biological unfitness at the basis of the neurotics' behavior or whether there is a " clumsiness " in adapting to emotional and other environmental situations, eventuating in vegetative imbalance. In whatever way it may have

developed, a degree of organic unfitness appears to parallel the altered psychological behavior in the patients studied in this experiment, as revealed in their relatively greater failure in acclimatizing to low oxygen tensions as compared with normal subjects. Further studies are indicated to determine whether there is a deficiency of oxygen transport or oxygen utilization in the tissues.

Summary and Conclusions.

The responses of 32 psychoneurotic patients (14 females and 18 males), with prominent symptoms of fatigue and exhaustion, were compared with those of 25 normal subjects (males) in their capacity to acclimatize in various oxygen tensions. There were five experimental sessions: two controls in air (21 per cent), two in diminished oxygen (12 per cent and 10 per cent), and one in excess oxygen (50 per cent). Physiological tests for respiration, pulse and blood pressure and psychological tests of motor and mental functions were given twice during each experimental session to determine not only the initial changes but also the degree of acclimatization during the two-hour period. Each subject was rated according to the degree of adaptation attained in the various oxygen tensions and detailed records were made of the most frequent complaints and symptoms. Biochemical and metabolism determinations were made on all of the subjects.

The patients appeared to be more severely impaired in the diminished tensions of oxygen than the controls; approximately 70 per cent of them collapsed in an atmosphere of 10 per cent oxygen, whereas this occurred in only 14 per cent of the control subjects. Extreme variations in pulse and blood pressure took place previous to or accompanying collapse. The scores of the patients in the psychological tests in air compared with O_2 lack were, on the average, poorer and showed a greater degree of variability throughout than the control group. When the tests were repeated during the second hour of each experimental session the psychoneurotics failed to acclimatize to the diminution of oxygen in the atmosphere as well as the normal subjects. The physiological symptoms of the psychoneurotics were less marked in excess oxygen; also in certain of the psychological tests the group variability was less and the means improved in 50 per cent oxygen.

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THE SCIENCE OF MAN.

By ALFRED KORZYBSKI.

The book of Dr. Alexis Carrel, Man the Unknown, has created a world-wide sensation, and in the opinion of this reviewer it is justified and a hopeful sign.

The unique importance of this book is due to four unique factors: (1) The author is a world famous surgeon of great knowledge and achievements, a Nobel Prize winner, a member of the Rockefeller Institute, and he has the medical authority to speak of the tragic shortcomings of medicine, physicians, scientists, educators; (2) he observed life in a great many aspects from a scientific, mostly medical, point of view, and he makes very clear that we are facing the problem of a sick society, sick civilization, including sick attitudes of scientists, physicians and educators; (3) he points out the shortcomings of university presidents and heads of great institutions, who either through ignorance or lack of vision cannot encompass the seriousness of the situation and waste enormous sums of money on trifling pseudo-researches, neglecting the really important medico-educational issues of sanity and progress (p. 48, 49); and (4) he has the courage to speak honestly and boldly.

Dr. Carrel's language is simple and direct. All the following italics are mine. The book is " dedicated to all whose *everyday task* is the rearing of children, the formation or the guidance of the individual. To school teachers, hygienists, physicians, clergymen, social workers, professors, judges, army officers, engineers, economists, politicians, industrial leaders, etc." (XV).

Carrel's main thesis is: " Men cannot follow modern civilization along its present course, because they are degenerating. . . . . They have not understood that their body and consciousness are subjected to *natural laws* . . . . as inexorable as the laws of the sidereal world. . . . . That they cannot transgress these laws without being punished " (p. XIII, XIV). The issues then crystallize into the problem of " knowledge " of the " natural laws " of " human nature," " because mental deterioration is more dangerous

to civilization than the infectious diseases to which hygienists and physicians have so far exclusively devoted their attention" (p. 20).

"Men of science do not know where they are going" (p. 23), and "modern civilization finds itself in a difficult position because it does not suit us. It has been erected without any knowledge of our *real natures*."

What is the science then to study and evaluate the "natural laws" of "human nature"? It would seem that "psychology" should be this "science." But is "psychology" developed enough to undertake this task? Carrel gives the proper answer: "The supreme science, psychology, needs the methods and the concepts of physiology, anatomy, mechanics, chemistry, physical chemistry, physics and mathematics—that is, of *all* sciences occupying a lower rank in the hierarchy of knowledge" (p. 290). Did any "psychologist" ever attempt to be *scientifically honest* in this sense? If so, then we have no record of such an achievement, simply because we do not "free ourselves from the mass of illusions, errors and badly observed facts, from the false problems investigated by the weak-minded of the realm of science, and from the pseudo-discoveries of charlatans and scientists extolled by the daily press" (p. 35, 36).

"But physiology is a science, while psychology is not. Psychology awaits its Claude Bernard or its Pasteur. It is in the state of surgery when surgeons were barbers; of chemistry before Lavoisier at the epoch of the alchemists" (p. 156).

What is then the way out? Carrel suggests a solution: "We now possess such a large amount of information on human beings that its very immensity prevents us from using it properly. In order to be of service, our knowledge must be synthetic and concise" (XII). "Man, as known to the specialists, is far from being the concrete man, the real man. He is nothing but a schema, consisting of other schemata built up by the technique of each science" (p. 3). "Although physicians, educators and hygienists most generously lavish their efforts for the benefit of mankind, they do not attain their goal. For they deal with schemata containing only a part of the reality" (p. 26). "Many physicians still persist in pursuing abstractions exclusively. . . . . Scientific Medicine, installed in its palaces, defends, as did the church of the Middle Ages the reality of the Universals. . . . . The distrust

which the public feels toward medicine, the inefficiency, and sometimes the ridicule of therapeutics, are, perhaps, due to the confusion of the symbols . . . . with the concrete patient who has to be treated and relieved. The physician's lack of success comes from his living in an imaginary world. Instead of his patients, he sees the diseases described in the treatises of medicine. He is a victim of the belief in the reality of Universals. He does not realize sufficiently that the individual is a whole . . . . and that anatomical divisions are artificial. The separation of the body into parts has so far been to his advantage. But it is dangerous and costly for the patient and ultimately for the physician" (p. 248, 249), and the public should "refuse to be attended by physicians knowing nothing but a small part of the body" (p. 281).

The difficulties ahead are very serious because: "The majority of men of science believe in the reality of the Universals, the exclusive right to existences of the quantitative, the supremacy of matter, the separation of the mind from the body, and the subordinate position of the mind. They will not easily give up this faith, for such a change would shake pedagogy, medicine, hygiene, psychology and sociology to their foundations. . . . . Hygienists would be asked why they concern themselves exclusively with the prevention of organic diseases, and not with the mental and nervous disturbances. . . . . Why they segregate people ill with infections, and not those who propagate intellectual and moral maladies. Why the habits responsible for organic diseases are considered dangerous, and not those which bring on corruption, criminality and insanity. . . . . Pathologists would be induced . . . . to take into account the influence of the mental upon the tissues and vice versa. Economists [and other specialists—A. K.] would realize that human beings think, feel and suffer, that they should be given other things than work, food and leisure . . . . and also that the causes of economic and financial crises may be moral and intellectual" (p. 280, 281). Indeed it is evident that specialists "before limiting themselves entirely to their particular domain, have not taken the trouble to acquire a general knowledge of man. The more eminent the specialist, the more dangerous he is" (p. 46).

Education of course depends on the advance of science and medicine, and in spite of the above shortcomings, educators have not acquired even this limited "knowledge of physiology and psy-

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Education of course depends on the advance of science and medicine, and in spite of the above shortcomings, educators have not acquired even this limited "knowledge of physiology and psy-

chology, which modern educators have not been given the opportunity of acquiring" (p. 85, 186), and from a *scientific* point of view: "*the present methods of education would seem absurd,*" and "schools and universities would be obliged to modify their programs" (p. 280).

Carrel, being a "specialist," realizes that: "It is impossible for a specialist, actively engaged in the pursuit of his own task, to understand the human being as a whole" (p. 45), yet such understanding is necessary to be able to "rescue the individual from the state of intellectual, moral and physiological atrophy brought about by modern conditions of life" (p. 293). And that: "the enterprise of our restoration must start immediately (p. 293) . . . . to prevent the organic and mental deterioration of civilized nations" (p. 292).

As a student of the history of civilization Carrel realizes that we need new methods of approach and that: "The future discoverer of a method for inducing tissues and organs to develop harmoniously will be a greater benefactor of humanity than Pasteur himself. For he will present man with the most precious of all gifts, with an almost divine offering, the aptitude for happiness" (p. 111), because "mental and nervous strength is infinitely more important than muscular strength. The descendant of a great race, if he has not degenerated, is endowed with natural immunity to fatigue and to fear" (p. 110). Carrel realizes that: "modern civilization absolutely needs specialists. Without them science could not progress. But before the results of their researches are applied to man, the scattered data of their analyses must be integrated in an intelligible synthesis. Such a synthesis cannot be obtained by a simple round-table conference of the specialists. It requires the efforts of one man, not merely those of a group. A work of art has never been produced by a committee of artists, nor a great discovery made by a committee of scholars. The syntheses needed for the progress of our knowledge of man should be elaborated in a single brain" (p. 47).

Carrel emphasizes that the supreme aim of different institutions should be to find out brains capable of such work, and give them a possibility for constructive work on such a synthesis. "The science of the human being does not need costly and numerous organizations in order to start its constructive work. It can utilize

those already existent, provided they are rejuvenated" (p. 286). He states and justly: "of course, the science of man has to use the concepts of all other sciences. But it must also develop its own. . . . . We must realize clearly that the science of man is the most difficult of all sciences," yet it must be produced if civilization is to be preserved (p. 9, 10).

"This superscience will be utilizable only if, instead of being buried in libraries, it animates our intelligence. But is it possible for a single brain to assimilate such a gigantic amount of knowledge? . . . . It seems that such an accomplishment is not impossible. In about *25 years of uninterrupted study* one could learn these sciences. At the age of 50, those who have submitted themselves to this discipline could effectively direct the construction of the human and of a civilization based on his true nature" (p. 285). The stakes are high, degeneration and nervous disintegration are progressing rapidly and something constructive must be done; "but is it indispensable to suffer the agony of chaos before reaching order and peace? Can we not rise again, without undergoing the bloody regeneration of total overthrow? Are we capable of renovating ourselves, of avoiding the cataclysms which are imminent, and of continuing our ascension?" (p. 277, 278).

All through the book Carrel emphasizes the influence of the environment, because: "Permanent modifications of body and consciousness may be produced by adaptation. In this manner, environment stamps human beings with its marks" (p. 215). "Man is the result of heredity and environment, of the habits of life and thought imposed upon him by modern society" (p. 273). "Should we not also incriminate the corruption and the stupidity of the politicians and the financiers, the ignorance and the illusions of the economists? Has not modern life decreased the intelligence and the morality of the whole nation?" (p. 275), as a factor of environment?

"We live in two different worlds, the world of fact and that of their symbols. . . . . But the abstract may be mistaken for the concrete. . . . . Most of the errors made by educators, physicians and sociologists come from such confusion. . . . . Education, medicine and sociology are concerned with the individual. They are guilty of a disastrous error when they look upon him only as a symbol" (p. 237).

Carrel, however, disregards other factors of the environment, as for instance, the fact that *with humans* the " second world " of symbols is as real and vital as the world of facts. No one can doubt that our orientations, " thoughts," " morals," plannings and so ultimately our actions depend on *symbolism* and *language* in connection with meanings, evaluation, etc., which cover all human psychological reactions. In other words, Carrel disregards an all-pervading factor of the human environment; namely, the linguistic and semantic environment, with definite and most important neurophysiological representatives in the human brain, without consideration of which a science of man, a science of adjustment and sanity are *impossible*.

In fact, this disregard of such an important and all-pervading factor of human environment has historically prevented a science of man. Mankind at present does not need to wait for Carrel's 25 years for a future science of man, because an individual has already spent 30 years of uninterrupted study and the science of man was founded in 1921 and formulated in the book Manhood of Humanity, The Science and Art of Human Engineering, later expanded in Science and Sanity, An Introduction to General Semantics. The science of man was originated and is progressing with *empirical results,* following a study of all sciences, mathematics included and their *languages* analyzed as forms of specifically human functioning. The neglect or disregard of neuro-linguistic and neuro-semantic mechanisms is as disastrous an error as to disregard the function of the heart or any other vital organ, or to disregard the dangers of infection.

General Semantics turns out to be a new empirical natural science and its effectiveness depends on direct stimulation of the human cerebral cortex, bringing about a strengthened dominance of the cortex over the lower nervous centers, evidenced by better adjustment and the automatic development of higher " mentality," better " morals, etc.," of 99 per cent of the students, as reported by the coworkers and verified in the seminars of the author.

At present General Semantics, which is the *modus operandi* of the science of man, is being applied in at least three " mental " hospitals, several educational institutions, private practice of several psychiatrists and by lay students. The new methods, because directly neurological, bring about standard, general and automatic

results. Some of these results were reported before the First American Congress of General Semantics, held at the State Normal School, Ellensburg, Washington, March 1 and 2, 1935. The proceedings unfortunately have not been printed for lack of funds. Other scientific papers also await publication. The work is carried on at present out of the meager salaries of the pioneers, and also is greatly handicapped by "our inertia. And not by the incapacity of our race to rise again" (p. 276), and also the metaphysical creeds which pervade the orientations of scientists, physicians and educators of which Carrel speaks on p. 280 ff. of his book.

It is not realized that physicians are mostly ignorant of neuro-psychiatry, and so medicine as practiced represents nothing but glorified veterinary science, and psychiatry without the science of man and General Semantics must remain metaphysical.

I cannot close this review with any better words than Carrel closes his most significant book: "For the first time in the history of humanity, a crumbling civilization is capable of discerning the causes of its decay. For the first time, it has at its disposal the gigantic strength of science. Will we utilize this knowledge and this power? It is our only hope of escaping the fate common to all civilizations of the past. Our destiny is in our hands. On the new road, we must now go forward" (pp. 321, 322).

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PSYCHOSIS WITH CARDIAC DECOMPENSATION.*

By JOSEPH C. MICHAEL, M. D., Minneapolis.

The psychic component of illness in patients suffering from cardiovascular disorders stimulates considerable interest for the psychiatrist. Mere accentuation of tendencies to every-night or harmless hallucinatory experiences in the dream process is observed without astonishment by physicians treating patients with cardiac decompensation. Preterminal psychic impairment in these patients is also regarded commonly as a sort of natural development.

This presentation is concerned, however, with major psychic disturbances modifying the individual's behavior longer than a mere transitory period. Its purpose is to review the widely varying theories about causation and development, and to assemble data collected from clinical records of 24 cases.

The clinician who attempts a detailed survey of the problems concerned soon finds himself beset with quite a series of questions, for some of which he will not find satisfying answers. He will be impressed by low incidence rate, by the preponderance of the males over the females, and by occasional lack of parallelism between the course of myocardial insufficiency and the complicating psychosis; he will ask himself, Is mind disturbance caused by toxic effects ascribable to digitalis? and, Is there perhaps some other toxic factor in this small per cent of the cases? If so, what is its type and origin, and how does it operate? Or he will query, Can it be that we are dealing with direct irritation of the brain, with cerebral circulatory disturbances, or possibly with structural alterations in the neural cells or fibres? Then, too, there are suggested such factors as anemia and hypoxemia readily affecting the function of the brain, impaired liver and kidney function in states of passive congestion with probable toxic elaborations from these viscera, etc. What are we to think about other associated infections or other states? And, what, if any, characteristic type of constitutional or psychogenic factors present themselves in the individual patients?

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Read at the ninety-second annual meeting of The American Psychiatric Association, St. Louis, Mo., May 4-8, 1936.

Review of the Literature.

The literature presents a marked lack of unanimity of opinions about pathogenesis. Following the old habit of blood letting, administration of diuretics to relieve the sufferer from his poisons was emphasized. Toxins arising from exudates in edematous tissues served frequently to explain psychic changes. Eichhorst in 1910, for an example, invoked edema or stasis only, leaving toxins out of the picture. Chronic anemic states were thought by some, and disordered liver functions by others, to adequately explain the origin of serious mind disorders in patients undergoing circulatory failure. A. Jacob [1] established quite definitely that no specific degenerative changes could be found in brains of patients who had died because of heart failure complicated by psychosis. This author called attention to several important physiologic and clinical considerations. He maintained that the brain is protected against disturbances of blood flow for a relatively long period, whereas the liver is affected relatively early, and that the circulating blood releases the psychic reaction through chemical influences. He surmised, but could not confirm, that nerve metabolism is affected. Neither rise nor fall in blood circulation is definitely associated with the reactions and digitalis influences the course more favorably than mere sedation therapy. Some extravasations of blood through capillary walls and apparent increase of lymphocytes in perivascular spaces suggested residuals of edema. Romberg [2] reported an incidence of 13 in 1200 cases of fatal heart failure; he noted psychotic development during either cardiac improvement or unfavorable progression. Reisman [3] mentions associated disease of the kidney, acidosis, drugs and alcohols as probably playing some part, whereas S. Wassermann [4] describes a confusional state under the caption "Cheyne-Stokes Psychosis."

Carr [5] reports two cases of digitalis intoxication, though the second case leaves one in doubt in favor of cardiogenic delirium. This author discusses the action of digitalis and calls attention to the importance of recognizing the toxic effects. In the latter instance, he noted that the drug must be withdrawn immediately, whereas in decompensation delirium, which occurs far more frequently, digitalis is indicated. Epigastric pain, anorexia, nausea and severe headache suggest effects of drug intoxication. Hamburger [6] reports

five cases in subjects with advanced and recurring heart failure. One patient had received only 12/100 grains of atropine in 48 hours; delirium followed for a course of three days. This he termed atropine poisoning. Advanced arterial changes were present in all and systolic blood pressure of over 170 was noted in four. Stone [7] noted onset of psychosis in one case of cardiac decompensation and he emphasizes its preferred incidence in advanced and recurring failures. In another case delirium ceased when bradycardia developed.

Moench [8] discusses three cases. He reports that moderate doses of digitalis were responsible for the development of psychosis. S. Wassermann [9] considers hypoxemia the one constant factor. Strooman,[10] on the other hand, finds edema of the liver as the one *sine qua non* in these cases. Amino-acids induce capillary dilatation, increased diffusion ensues and thus the hepatogenic toxic factor becomes very probable. Urechia [11] emphasizes cerebral stasis. Wolfe [12] briefly refers to causal processes, such as liver congestion and auto-intoxication.

Survey of Twenty-Four Cases.

Incidence.—Case records for the decade 1926-1935 indicate 2293 admissions to the Minneapolis General Hospital because of cardiac decompensation. Of these 23 different subjects were treated for psychosis. One case recently encountered in private hospital practice was included; thus 24 patient records were reviewed and it is on these that this survey is based.

Sex.—Our hospital records of the 2239 10-year case series disclose that incidence of cardiac decompensation is twice as great for men as for women. The cases complicated by psychosis indicate male preponderance of 5:1. (See Table I.)

TABLE I.

Age and Sex.

Age	44-45	46-50	51-55	56-60	61-65	over 65
Male	3	1	5	3	2	6
Female	0	1	1	0	0	2
Total	3	2	6	3	2	8

Age.—Age distribution ranged from 44 to 84. Table I indicates distribution by age periods. About half of 24 cases were 55 years old or less and the other half were over 55.

Heart Stimulus Employed.—The records indicate that digitalis was prescribed in 20 cases suffering from congestive heart failure. Quinidine, euphyllin, thephyldine, theocalcine were administered occasionally only, particularly the latter three. In the Department of Medicine it is the custom to calculate the dose of digitalis so that two-thirds of the amount advised by Eggleston is administered. Toxic symptoms from over-dosage, Dr. George Fahr, Chief of that Department, and his associates report is a most rare observation.

Psychic Syndrome.—Hypnagogic hallucinations are met with frequently at the time of onset. A confusional state is common. Emotivity tends to exaggeration, and violent outbursts make management difficult. Paranoid trends are prominent in some cases of longer duration. In five cases suicidal attempts were observed once or a number of times. Incooperative attitude accounts for some otherwise preventable deaths. Prior to the establishment of a hospital unit for psychopathic patients there were more instances when relatives refused cooperation to facilitate transfer to the state hospital and allowed interruption of hospital care. One patient was readmitted five times in seven months, insisting on premature discharge in all but the last instance! The psychic syndrome, as noted above, is of the organic-toxic type. Its course may be relatively brief, or it may extend to a number of months. Two or three weeks is the average duration. Three cases in this series had atypical psychotic features; their course was prolonged, necessitating transfer to the state hospital. One of these was a chronic alcoholic, another had a psychopathic character, the third suffered from a neuro-syphilitic complication. In one case it appeared that the psychotic complication cleared up several hours prior to death.

Onset of psychosis may occur at any time during the course of congestive heart failure. Recovery tends to coincide with improvement in signs of heart failure. Some authors report onset of delirium prior to beginning of evidence of failure, but in our subjects that relationship could not be established. On the other hand, onset of delirium coincident with recompensation was found in two cases of congestive failure. The prognosis in this type is

favorable. Available records do not suggest a psychopathic constitution or individual tendencies which might explain the psychosis in our 24 subjects. In two patients decompensation and psychosis had been present previously; a period of well-being had intervened between the first and recurring attacks.

Liver Edema.—This complication was apparent in 20 cases.

Hypertension is known to have preceded cardiac decompensation in 15 cases.

Valvular diseases were noted in three subjects only. Patients with such defects tend to die in or previous to the fifth decade of life.

Duration of continued signs of cardiac decompensation preceding the onset of psychosis varied between one day to six months with the exception of Case 2. In six instances this period was less than one week.

TABLE II.

COURSE.

	Recovery.		Death.	
Sex	Age 55 or less	Over 55	55 or less	Over 55
Male	6	4	4	6
Female	1	1	0	2

Auricular fibrillation was noted in 16 cases. Auricular fibrillation, without signs of edema in legs, liver or lungs, was noted in four cases.

Cheyne-Stokes type of breathing was recorded in seven cases.

Pulmonary edema without signs of rightsided heart failure was not noted in this series of cases.

Uremia was ruled out as a causative factor for psychosis in all cases.

Other Disease Complications.—(a) Syphilis was established in three cases. (b) Cerebral arteriosclerosis was not determined clinically in this group below 56 years of age, and it appeared prominently only in those above 65. (c) Alcoholism was a factor in one case.

Termination.—As noted in Table II, of the 11 patients under 56 years of age, seven recovered and four died. Of the 13, 56 or over, five recovered and eight died.

Illustrative Case Reports.

Case 1. *Hypertension and Coronary Sclerosis with Delirium, Ending in Death.*—A male, aged 44 years (youngest of series) who had been treated in the hospital for gastric ulcer and heart disease in 1927 and on several occasions since then. Distention and pain in abdomen were present for two months, especially after taking liquids. Dyspnœa was present on very slight exertion and a chronic cough was noted. The blood pressure was 212/140. Admitted again in 1935, the patient was confused, he cooperated very poorly and at night he was quite disturbed. Pronounced irritability was present until the forty-sixth day, when he expired following development of terminal pneumonia.

Case 2. *Recurring Delirium and Recurring Attacks of Cardiac Decompensation with Recovery.*—A male, 56 years of age, was admitted to the hospital on November 2, 1932, a few hours after the onset of delirium. Signs of heart failure associated with mitral stenosis and auricular fibrillation were known to have been present for five months, during which time he was treated in the out-patient clinic. Digitalis was prescribed for the last two weeks of clinic treatment. During these two weeks he vomited after taking this medicine in pill form. On admission he was confused, disoriented, agitated and expressed a variety of delusions. Digitalis and sedative drugs were administered daily following admission and on the fourth day, after a good night of sleep, improvement was noted and on the 14th day the psychosis and heart failure disappeared simultaneously. The patient remained mentally unimpaired until February 27, 1933, when he again became delirious two days following recurrence of heart failure. Digitalis was again prescribed and on March 28, 1933, he recovered from both psychosis and heart failure.

Case 3. *Hypertension and Heart Failure in a 71-Year-Old Male, Ending in Early Recovery.*—The patient had some cardiac symptoms for one year though he felt fairly well until three weeks before admission, when he developed a cough. One week later failure signs were apparent when he became short of breath on exertion. On admission mind impairment was in evidence in that he was confused, retarded, restless and incooperative. On the 16th day delirium disappeared and by the 26th day failure signs had progressed so favorably that transfer to his home became feasible. Digitalis was administered from the day of admission until recovery had taken place.

Case 4. *Mitral Stenosis and Regurgitation, Auricular Fibrillation, Cardiac Decompensation and Delirium in a Female, Aged 46.*—The patient had suffered from polyarthritis at the age of 11. Following an attack of influenza seven years prior to admission, shortness of breath and palpitation were noted. She was hospitalized twice for recurring heart failure. Failure signs were in evidence for three weeks prior to this last admission. Tincture of digitalis was prescribed on the third day after reception and continued ten days. During the third week quinidine was administered in three grain doses every

two hours for three days. On the third day of this medication patient became stuporous, and soon she began to express much anxiety and she became very restless. After ten more days signs of cardiac failure and psychosis disappeared.

CASE 5. *Cardiac Decompensation, Auricular Fibrillation, Hypertension, Delirium Following Onset of Decompensation.*—A male, aged 52 years, a manual laborer. Twenty months prior to admission the patient noted shortness of breath on slight exertion and for a few months some palpitation. Decompensation, however, was interrupted by intervening periods of fair compensation. Sedatives were administered the first day of hospitalization. Digitalis was started on the second day and on the eighth day quinidine was given and both were continued for the remaining 39 hospital days. On the 26th day, when the signs of heart failure were receding, the patient became noisy, combative, irritable, spat on the floor and screamed loudly. But on the 38th day this mental disturbance disappeared and on the 47th day he was discharged with cardiac function considerably improved.

COMMENT.

Analysis of the records of a large number of cases of cardiac decompensation impresses one, first of all, that incidence of psychosis, approximately 1 per cent is comparatively rare.

The higher incidence of cardiac decompensation in males over females, 2:1, conforms presumably with our notions regarding the preponderance of physical stresses and exogenous poisonings in males. However, the strikingly higher incidence of psychosis in males over females, 5:1, leaves us without adequate explanation.

This review study indicates that digitalis is not the cause for psychosis complicating cardiac failure. In two cases the onset of psychosis occurred on the third day of quinidine treatment. However, comparison with other nonpsychotic cases brought out no variations in duration or total amount of quinidine administration. Nevertheless, it is to be borne in mind that individual sensitivities to quinine and some of its derivatives present at times rather marked variations, and that these include psychic components. Neither age incidence, duration of Cheyne-Stokes breathing, duration of heart failure symptoms prior to onset of psychosis, the degree of heart failure, the type of cardiac lesion, nor associated disorders can be shown to distinguish the psychotic from the nonpsychotic decompensated heart patient.

Neuropathological investigations reported in the literature have not shown specific central nervous system changes.

Cerebral arteriosclerosis, constitutional or reactive antecedent or incidental psychic states, alcoholism, syphilis, etc., may of course modify the course of mind disorded to the extent that prompt recovery, the rule in patients who recover from heart failure signs, is delayed. Arteriosclerosis obviously requires prominent consideration when we contemplate pathogenesis. Fifty-four per cent of this series of patients were over 55 years of age. Yet there is no variation from the age groups of the nonpsychotic decompensated patients. Investigation of the records with respect to the degree of suddenness of onset of decompensation or of subsequent reestablishment of compensation furthered by heart stimulants also failed to indicate a definite causal relationship. And, after ruling out apparent hereditary or psychopathic trends, we are still left with one of our main questions unanswered in specific terms: Why do 1 per cent of the heart failure patients develop psychosis whereas 99 per cent do not?

Low incidence then suggests the factor of individual personality differences.*

Summary.

Attention is called to the various prevailing theories with reference to the pathogenesis of psychosis in patients suffering cardiac failure. The literature is reviewed to indicate widely differing viewpoints.

The records of 2293 admissions to a public hospital during the last decade because of cardiac decompensation indicated that 23 patients were treated because of complicating psychosis. Data from these and one additional patient are reviewed.

Incidence, sex, age, heart stimulants employed, cardiac complications, hypertension, liver edema, other complicating diseases and course are discussed.

Comparatively rare incidence of psychosis in cardiac failure is indicated. Digitalis and other drugs were not found to cause psychosis in this series of patients. Associated syphilitic infection was found in three cases, but, excepting one of these subjects, syphilis

* Incidence of psychosis in insulin induced hypoglycemia of diabetes presents a striking analogy. More recently F. K. Störring (D. Med. Wochnschr., 63: 1, 10-12, Jan. 1, 1937) reported complication by psychosis in 12 out of a series of 1200 subjects.

apparently could not account for the development of psychosis. Alcoholism was an etiologic factor in one patient's psychosis. The status of arteriosclerosis was found to be inferential; 13, or 54 per cent, of the patients presented clinical signs of cerebral arterial degeneration.

However, no one or series of causative factors were noted which were not also observed in the 99 per cent nonpsychotic subjects treated for cardiac decompensation.

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DISCUSSION.

DR. LLOYD H. ZIEGLER (Albany, N. Y.).—This has been a most interesting paper. It is too bad that Dr. Michael did not have time to read the whole paper. These conditions are primarily delirious reactions or toxic psychoses, or, as Dr. Southard called them, somato-psychoses, and as such they are characterized by disorientation chiefly, partial or complete, more especially in the evening or at night. Overactivity and hallucinatory experiences are common. We have seen a number of these in our clinic, and we have

been interested to know what kind of person develops this syndrome. It seems to occur mostly in men and those who have been quick to move and respond to stimuli. It is obvious that arteriosclerosis and age are factors. The arteriosclerosis is not necessarily confined to the brain but affects the heart and other body structures. Problems of water balance and edema must be considered in trying to understand such patients. Not all persons with water-laden tissues develop such psychotic reactions. One might consider the edema to deprive the tissues of the normal amount of oxygen. To administer oxygen has helped a few of our patients temporarily. Some have been given too much drug, including digitalis, and the withdrawal of drugs has helped them. It is our opinion that delirium with heart failure has about the same incidence that it has with other serious diseases such as pneumonia.

AN EVALUATION OF OPPOSED THEORIES CONCERNING THE ETIOLOGY OF SO-CALLED "DEMENTIA" IN DEMENTIA PRÆCOX.*

By MARY PHYLLIS WITTMAN, M.S., PH.D.

I. Statement of the Problem.

This paper presents a study of the validity of opposed theories concerning the etiology of so-called "dementia" in dementia præcox (schizophrenia)—theories stressing organic brain pathology as opposed to those stressing psychogenesis.

II. Orientation.

At the present time the two terms, dementia præcox and schizophrenia, are often used as synonyms for the same psychotic states, but the etiological theories and the characteristics stressed by the two schools of thought are widely varied rather than in agreement. J. V. May [12] in an article on "The Dementia Præcox-Schizophrenia Problem" considers "Kraepelin's original description of dementia præcox (as essentially a deteriorating process) is diametrically opposed to the theories later advanced by Bleuler." A study by May of the incidence of dementia præcox as reported by authorities in various parts of the country showed a wide divergence of opinion as to the nature of the disease.

One of the most obvious differences between the various theories concerning this psychosis is the disagreement as to the presence of a true "dementia" and the cause of it, if it *is* present. Up to this time, however, the conflicting conclusions reached have been based (with one outstanding exception) upon observation and study of the patient's reactions rather than on any direct *experimental* attack

* An abstract of an original study presented as a requirement for the degree of Doctor of Philosophy in the Department of Psychology, University of Chicago, December, 1936.

Appreciation is expressed to Dr. Andrew Brown, Institute for Juvenile Research and University of Chicago, under whose direction the study was made and to Dr. C. F. Read, Elgin State Hospital, for his co-operation and encouragement.

upon the problem.[9] F. L. Wells,[17] F. D. Barnes,[2] E. G. Boring,[5] S. L. Pressy,[14] and other psychologists stressed the indifference and inattention typical of the schizophrenic patient's performance on psychometric tests but they did not try to evaluate experimentally the importance of this lack of cooperation in the test results.

Dr. Harriet Babcock's study [1] of intellectual deterioration in the dementia præcox patient is, however, an experimental attack upon this problem. This research purports to show:

A. That experimental technique (a test of mental deterioration) gives evidence that the phenomena of dementia præcox are similar to those observed in other diseases where organic deterioration rather than mental habituation is the accepted basis of abnormality. Since deterioration will explain all the phenomena of dementia præcox, it is valid *prima facie* to accept the general explanation which accords with other types of abnormality, and it becomes unwarranted to hypothecate other causes based on observations of normal persons.

B. That certain aspects of dementia præcox can only be explained with reference to a theory of mental impairment due to organic or physiological causes.

The technique of this study was to measure the mental efficiency * of dementia præcox patients and compare it with that of normal subjects to "learn whether their apparently weak attention and lack of interest and will correlate with mental inefficiency which is not within their control, or whether it exists with normal ability to perceive and fixate new data." [1]

From the data gathered Dr. Babcock concludes that *co-operative præcox patients are as a group inferior to normal persons in ability to understand and execute simple tests. The results also show that the intellectual defect which Kraepelin considered to exist in the very earliest stages, though the fact was not then clearly demonstrable, not only exists but can also be measured.*

The difficulty in accepting these conclusions lies in the fact that no attempt was made really to evaluate the "co-operativeness" of the "subjects." Their classification as co-operative is based simply on Dr. Babcock's subjective opinion of their reactions. Co-operation in a psychometric examination implies, however, more than just a fairly relevant response and a passive acquiescence to the

*The term "mental efficiency" is used to indicate a subject's mental ability at a given time without the assumption of stability and permanence that is often connoted by the term "mental ability."

requests of the examiner. A co-operative subject in a test situation is one who has the wish to do as well as possible because of the wants listed by Thorndike, such as want for success, want for personal regard, and want for esteem of the examiner.

In Dr. Babcock's study no evaluation was given to the factors of disinterest and inattention that conceivably might have influenced the degree of co-operativeness and interest her psychotic subjects took in the tests, and hence the effect these factors had on the test results was not determined. This is the problem which the present study seeks to investigate.

III. Rationale for the Technique Used in this Study.

The majority of organically deteriorated patients (paretics, seniles, etc.) are, as a general rule, co-operative and interested enough in a test situation to do the best they can with their limited ability. In recognition of this, the clinical psychologist usually takes the co-operation of these patients on psychometric examinations more or less for granted (just as he does with the non-psychotic), unless their reactions indicate a definite lack of interest and attention. Consequently, if the patient's intellectual level is markedly lower than his former educational and professional achievements would lead one to expect, the possibility of an intellectual deterioration from a formerly higher mental level is assumed.* In other words, with organic cases, the indirect evidence of deterioration (*i. e.*, poor performance on tests of present mental ability as compared with estimates of past ability) is regarded as a functional expression of the pathology present.

If, then, the poor showing made by a schizophrenic patient in tests of ability is due to an intellectual deterioration associated with organic pathology † (similar to that in the accepted organic psy-

* "The great majority of psychiatrists not only hold that dementia consists in the impairment of such extensive mental powers as memory, judgment, conception, etc., but also believe—in company with most psychologists—that an ordinary mental test measures one of these powers." [7]

† "The morbid anatomy of dementia præcox does not show macroscopically any striking changes of the cranial contents; only occasional thickening and œdema of the pia are reported, the latter evidently a result of the agonal process. On the other hand, it has been shown that in the cortex we have to do with severe and widespread disease of the nerve-tissue." [10]

choses), his co-operation, other things being equal, is not the primary factor in determining the results; his ability is the important factor.

However, to test this premise, we have to deal with three variables: (1) ability on the tests, (2) degree of co-operation, (3) actual degree of intellectual deterioration. Only the first two of these can be known experimentally. Mental deterioration is indirectly evidenced in the test results, so that if the co-operativeness of the patient must also be considered, it is difficult to determine the degree of intellectual deterioration, if any.

Since, then, there is no direct way of measuring this third variable, there is a possibility that, in the dementia præcox cases, degree of co-operation may be highly correlated with degree of deterioration and in turn with test scores. If such is the case, the uncooperative schizophrenic patient would also be the mentally deteriorated patient, and low test scores might be attributed to either one or both of these factors.

Intellectual dementia on an organic basis is considered a more or less permanent thing, and although it is true that organically psychotic patients in a state of remission may show some improvement in mental efficiency, nevertheless this efficiency is seldom up to its previous maximum level. In addition it is difficult to conceive of pathology severe enough to cause an intellectual deterioration changing with the ease and frequency of an "attitude" (*i. e.*, one way of describing co-operativeness), which *may* change from one hour to the next.

Consequently, if patients who co-operated poorly and made low test scores on the initial examination, but who, when retested two weeks or a month later (because they showed a marked improvement in attitude) make much higher scores on parallel forms of the tests, we can conclude that the initial low test scores were not due to an intellectual deterioration on an organic basis. An organic pathology, if directly comparable to that in paresis or senile dementia, would not only be profound enough to cause definite intellectual deterioration (dementia), but would result in the involvement and progressive destruction of cortical function. In such cases mental inefficiency would be causally related to this pathology rather than to the "attitude" of the patient and would not tend to lessen progressively as the patient's co-operativeness increased. Consequently, if change in mental efficiency for a given

subject is directly proportional to the change he shows in degree of co-operativeness, we may assume that the apparent deterioration as measured by ability to perform given tests is not the same as the true deterioration of paresis and senile dementia.

Therefore, this study, attempts to:

A. (1) Find the relationship between co-operation measures and ability scores for schizophrenic patients.

(2) Use the same estimates of co-operation and tests of ability on patients with a clinical diagnosis indicating a known organic pathology associated with progressive dementia (*i. e.,* paresis) in order to note differences and similarities when compared with the schizophrenic group.

(3) Give the objective tests of co-operation and the tests of intellectual ability to a group of non-psychotics to check on the validity of the co-operation tests.

(The three groups are roughly equated as to initial intellectual ability by making them directly comparable as far as educational achievement is concerned.)

B. Retest those schizophrenic subjects who show a definite change in co-operation, as determined by the examining psychiatrist, to find whether their ability scores are related directly to changes in degree of co-operation.

Then (a) If degrees of co-operation do not show a direct relationship with scores in tests of present mental ability on the retests, as well as on the initial tests, we may assume that the test scores give a fairly accurate measure of the true intellectual ability of the patient. In other words, such results would indicate that the patient has deteriorated intellectually, so that, although he may improve as far as "attitude" and the wish to co-operate are concerned, he is unable to do significantly better on the tests of ability because of this deterioration.

(b) If, however, we find a direct and significant relationship between changes in co-operativeness and changes in test scores, we have proved not only the rather obvious fact that the co-operativeness of the patient influences his test score, but that it is the lack of co-operation rather than a "progressive dementia" that is directly responsible for the low test scores made by the schizophrenic patients.

IV. Procedure.

A. SUBJECTS.

1. One hundred patients, inmates of the Elgin State Hospital, diagnosed as cases of dementia præcox at Cook County Psychopathic Hospital, and this diagnosis confirmed by the staff at the Elgin Hospital.

2. Seventeen of these one hundred patients who had shown a decided change toward a more co-operative attitude in a relatively short time were retested with parallel forms of the initial ability tests.

3. Thirty patients, diagnosed syphilitic-meningo-encephalitis (paresis), at Cook County Psychopathic Hospital, and this diagnosis confirmed by the staff at the Elgin institution.

4. Thirty non-psychotic subjects consisting mainly of medical, clerical and attendant personnel at the Elgin Hospital.

The patients were selected groups only to the extent of excluding: (1) patients of foreign birth and education, (2) patients under 16 years or over 50 years of age, (3) patients with lower educational qualifications than graduation from grade school,* (4) mute, negativistic or actively resistive patients whose performance on any sort of test (because of their mute or negativistic attitude) could be safely predicted as zero.

In practice it was found advisable to administer the tests to all the patients in the psychologist's office, since the facilities for private testing on the wards, especially of bed patients, are limited, and hence a further selection was made of ambulatory cases that could come directly to the psychologist's office.

B. TEST MATERIAL.

(a) A series of ten objective test measures of the attention, interest and co-operativeness of the subject were used.

*When all the paretic and over half of the schizophrenic group had been examined, a further selection of præcox patients was made in order to adjust the schizophrenic group in direct proportion to the paretic group as far as education was concerned. In addition, some of the non-psychotic subjects were dropped from that group and others added so that they were directly comparable in educational achievement with the other two groups.

(b) A check list * of levels of co-operation was filled out for each patient by his ward physician.

(c) A graphic rating scale of co-operativeness was used by the supervisor and by the charge attendant on the patient's ward in rating each patient.

(d) Tests of memory:

(1) Rote memory for words.
(2) Immediate reproduction of memory paragraph.
(3) Picture recognition.
(4) Paired associates.
(5) Retention of memory paragraph.

(e) Tests of reasoning:

(1) Analogies.
(2) Number sequence.
(3) Similarities.
(4) Arithmetic problems.
(5) Essential differences.

C. METHOD.

1. Administration of Tests.

Each Monday over a period of several months, the names of the patients admitted from Cook County Psychopathic Hospital the previous Friday † with a diagnosis of dementia præcox or paresis were listed. Those who could be classified as appropriate subjects (that is, according to age, education and other qualifications) were tested, usually after the examining staff physician had concurred in the diagnosis given at the Psychopathic Hospital. Of the præcox subjects tested, several had to be dropped because at staff conference the majority of the Elgin staff did not agree with the diagnosis of schizophrenia, and the classification was changed. This method of selecting patients required that the experimenter

* The check list and rating scale were not used with the non-psychotic group, since the co-operation of these volunteer subjects was more or less assumed, and their perfect scores on the object tests of co-operation corroborated this assumption.

† Once a week patients are sent from the Cook County Psychopathic to the Elgin State Hospital. From 30 to 50 patients arrive each week in this way.

know the diagnosis of the patient previous to testing, but this knowledge did not influence the formal technique of giving and scoring the objective tests, and so did not influence the results.

The administration of the tests was the same for the schizophrenic, paretic and non-psychotic subjects. In an attempt to gain interest and hold the attention of the patients, all the questions and test instructions were given orally. The examiner read aloud the instructions for the different reasoning tests while the patient was asked to follow by reading either aloud or to himself the same instructions.

The order of giving the tests was alternated, one subject being given the tests of co-operation first and then the tests of ability, while the next patient was given the ability tests first and then the tests of co-operation.

2. Determining Reliability of Measures of Co-Operation.

Four estimates of the co-operativeness of each psychotic subject were secured. The first was a purely objective score based on the patient's performance on a number of so-called tests of co-operation. The second was based on the check list filled out for each patient by his ward physician and scored by the experimenter in numerical terms. The third and fourth estimates were obtained from the scoring of the graphic rating scales filled out independently by a supervisor and charge attendant respectively on each psychotic subject.

The intercorrelation between the estimates was in every case high enough to warrant the inclusion of those estimates in the average. The agreement between the four groups, considering each one as a check upon the other, was sufficient to validate these estimates as measures of co-operation.

V. Results.

A. Comparison of co-operation scores for the three groups.

The average co-operation score for the schizophrenic group is definitely lower than the average for the other two groups.

Group.	Test score average.	Doctors' score average.	Supervisors' score average.	Attendants' score average.	Total score average.
Schizophrenics	81	68	65	69	71
Paretics	96	94	88	81	88
Non-psychotics	100	..	..	..	100

The relatively low co-operation scores for the dementia præcox group agree with the generally accepted concept of disinterest, apathy and inattention as more or less typical characteristics of this psychosis. The majority of paretics, on the other hand, co-operated well, but, as might be expected with any psychotic group as compared with a non-psychotic group, some of the paretics were relatively disinterested or inattentive, bringing down the average score for this group to 88, as compared with the score of 100 for the non-psychotic group. The non-psychotics (who had shown their interest by volunteering to act as subjects) co-operated perfectly in the test situation.

B. COMPARISON OF ABILITY SCORES FOR THE THREE GROUPS.

The non-psychotic group, without a single exception, made the highest average scores on the individual tests and consequently the highest total scores. The schizophrenic group came next, with higher scores on all the tests than the paretics but with lower scores in each case than the non-psychotics.

	Memory Tests.					
Group.	I.	II.	III.	IV.	V.	Total memory score average.
Dementia præcox ..	14	10	12	5	10	52
Paretics	8	5	10	3	8	32
Non-psychotics.....	16	17	17	14	17	76

	Reasoning Tests.					
Group.	I.	II.	III.	IV.	V.	Total reasoning score average.
Dementia præcox ..	8	5	5	6	9	33
Paretics	4	3	2	4	3	19
Non-psychotics	15	12	10	9	13	61

In comparing the ability scores given above with the co-operation scores for the three groups, the change in relative standing of the two psychotic groups is noted. The præcox group that had been lowest in co-operation scores moves up to the middle, the paretics are down in the lowest position, while the non-psychotics hold their position of first place.

The shift between the two psychotic groups is due to the introduction of another factor in the determination of ability scores that

was not present in the co-operation scores. The "dementia" of the paretic subjects definitely lowered their ability scores so sharply that this group drops to the lowest position relative to the other groups. Co-operation also plays a part in the ability scores; hence the schizophrenics' level is not equal to the non-psychotics' level, but this loss is less than the loss due to the disability of the demented paretic groups; so that the schizophrenic and paretic groups change relative positions.

C. CORRELATION BETWEEN CO-OPERATION AND ABILITY SCORES.

The following tables give the correlation coefficients found between degrees of co-operation and ability on the memory and reasoning tests for the three groups of subjects. These tables substantiate the thesis that, with schizophrenic subjects, there is a direct and close relationship between degree of co-operation and ability test scores, while with the paretic subjects this is not true.

The correlations found for the paretic group, while positive (with one exception), are so small as to be insignificant as far as indicating a direct relationship between co-operation and ability scores is concerned. This does not mean that degree of co-operation did not influence the ability scores, but that this influence was overshadowed by (because unrelated to) another very important factor, namely, the degree of dementia from which the patient suffered. The only negative correlation found was between degree of co-operativeness and Fernald's recognition of pictures test. No adequate explanation is offered, and it is suggested that it be considered as possibly an artifact associated with the test, its presentation, or with the paretic subjects taking the test.

MEMORY TESTS.

	Schizophrenics.		Paretics.	
I. Rote memory for words.....	+.60	±.04	+.28	±.11
II. Memory paragraph	+.76	±.03	+.25	±.11
III. Recognition test	+.75	±.03	−.12	±.12
IV. Paired associations	+.84	±.02	+.14	±.12
V. Retention of memory paragraph..	+.76	±.03	+.30	±.11
Total memory score.....	+.68	±.04	+.15	±.12

REASONING TESTS.

	Schizophrenics.		Paretics.	
I. Analogies	+.69	±.03	+.21	±.11
II. Arithmetic series	+.74	±.03	+.17	±.12
III. Similarities test	+.58	±.04	+.09	±.13
IV. Arithmetic test	+.94	±.01	+.14	±.12
V. Essential difference test	+.75	±.03	+.46	±.11
Total reasoning score	+.62	±.04	+.14	±.12

All the non-psychotics co-operated so well that all made perfect scores on the co-operation scale. Thus, variations in ability scores were in no way related to this identical co-operation score, a perfect one, made by every subject in the group. Consequently there should be no correlation because there were no differences in ability.

These results indicate that with the paretic and non-psychotic groups, although a high degree of co-operation is necessary to obtain a high test score, the reverse is not necessarily true. In other words, high test scores imply co-operation, but co-operation does not necessarily imply high test scores.

There was one factor in the test arrangement for this study that tended to lower the degree of correlation between co-operation and ability scores for the dementia præcox group. Certain of these præcox subjects were motivated enough to perform well on the very simple tests of the co-operation scale, thereby attaining a score indicating a high degree of co-operation. These same subjects, however, on the relatively more difficult ability tests showed less interest and attention, and they made a much poorer showing. This difficulty had been considered at the time the testing was started and an attempt made to overcome it to some extent. A rapport was sought that would motivate the patient, as the result of the encouragement and interest shown by the examiner, to exert himself on the ability tests as well as on the simpler co-operation tests.

This motivation of the patient to make relatively as much effort on the ability tests as on the other easier tests was not successful, of course, with all the præcox subjects. It was with these subjects (who performed the simple tests of co-operation well but who were not motivated enough to exert themselves on the ability tests that

required sustained attention and interest), that the ratings of co-operation furnished by the supervisors and attendants were essential. The attendant and the supervisor have close and fairly constant contact with the patient on the ward as well as at work, and it was thought that the tendency referred to above (*i. e.*, refusal to exert himself at any task that seemed relatively difficult or uninteresting) might influence these employees in their ratings of this type of patient.

D. COMPARISON OF INITIAL AND RETEST SCORES OF SCHIZOPHRENICS.

Those dementia præcox subjects who were reported by the ward physician to have shown a definite change in attitude toward greater co-operativeness (within a relatively short length of time) were retested with parallel forms of the original ability tests. New estimates of co-operation were also secured for these patients.

The results are definite and consistent. Within a period of from two to twelve weeks the patients had improved in co-operativeness from an average of 60 points to an average of 87 points. At the same time they improved on the memory tests from an average total of 38 to 69 points, and on the reasoning tests from 23 to 51 points on the average total.

These findings corroborate the thesis that the so-called "deterioration" in schizophrenic patients, indicated by their lack of ability on psychiatric and psychometric tests, can *not* be due to a pathological involvement and destruction of cortical function, as has been demonstrated, for example, in advanced cases of paresis.

The direct and positive relationship between change in co-operation and accompanying change in ability level stresses the importance of the rôle co-operation plays; while, on the other hand, the very great improvement in ability indicated in the test scores could not have been achieved (especially in such a relatively short time) if there had been definite organic pathology with destruction of cortical function. This is contrary to Kraepelin's stand that the "dementia" found in dementia præcox "is similar to other forms of dementia, such as are known to us as the result of paralysis (paresis), senility or epilepsy."[10] It is also contrary to Dr. Babcock's conclusion that "the *intellectual defect* which Kraepelin considered to exist in the very earliest stages, though the

fact was not then clearly demonstrable, not only exists but can be measured."

The direct relationship between increase in co-operation and increase in ability scores indicates that the so-called "dementia" in schizophrenic subjects is an apparent rather than a true one, due to the apathy, inattention and lack of motivation of the patient in the test situation.

VI. Statement of Results.

A. The schizophrenic subjects as a group were less co-operative than the syphilitic meningo-encephalitics (paretics). The non-psychotics all classified at the maximum level of co-operativeness.

The schizophrenic group was a much more heterogeneous one as far as co-operativeness was concerned than the other psychotic group (paretic). The non-psychotic group all classified at the same point, indicating complete homogeneity in respect to co-operativeness.

B. The non-psychotic group made definitely higher ability scores than either of the psychotic groups. The paretics' scores were bunched at the lower end of the scale, the non-psychotics at the upper end, the dementia præcox group ranging from the lowest paretic extreme in score to very near the highest non-psychotic score.

C. There was a marked difference between the relationship of ability scores and co-operativeness for the three groups. The scores made by the præcox group were not only influenced by the degree of co-operation but were largely dependent upon it.

The *positive*, though small, correlation between paretic ability and co-operation indicates, as might be expected, that degree of co-operativeness also influenced to some extent the memory and reasoning scores. The low correlation coefficient for the paretic group indicates that the amount of intellectual deterioration the paretic patient had experienced was largely responsible for the pathologically low scores made on the ability tests.

The non-psychotic group were all motivated to do the best they could in this particular test situation, so that differences in memory and reasoning scores may be taken as definitely indicative of differences in memory and reasoning *ability*.

D. The second scores of the schizophrenic patients, retested because they had shown an increase in co-operativeness following the initial testing period, were definitely higher than the first scores. The increase in ability scores was directly connected with increase in co-operation scores. This refutes definitely the theory that the so-called "dementia" of dementia præcox subjects is similar to that "observed in other diseases where organic deterioration rather than mental habituation is the accepted basis of abnormality." [1]

VII. Conclusions.

The type of inability displayed by dementia præcox patients on psychiatric and psychometric examinations is not directly due to an organic pathology causing intellectual deterioration. It *is* due, on the other hand, to certain psychological factors such as apathy, disinterest, inattention, abulia, etc., which in turn may have either a physiological or a psychological basis, or both.

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PREFRONTAL LEUCOTOMY IN THE TREATMENT OF MENTAL DISORDERS.

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A year has elapsed since I inaugurated a surgical procedure in the treatment of certain psychoses. Guided by certain physiologic and clinical data, I suggested that by interrupting some of the connections between the prefrontal lobes and other parts of the brain, some modifications might be brought about in the mental processes of psychotic individuals. The first results were encouraging and I published them in a monograph.* Subsequent observations, moreover, showed that we were following a procedure that was of benefit to mental patients.

The idea was to operate upon the brains of the patients, not directly upon the cell groups of the cortex or of other regions, but rather by interrupting the connecting fibers between cells of the prefrontal area and other regions, that is to say by sectioning the subcortical white matter. As a result of the interruption of the cylinder axes the cells of the prefrontal area and of other regions of the brain connected with these would be affected secondarily.

The hypotheses underlying the procedure might be called in question; the surgical intervention might be considered very audacious; but such arguments occupy a secondary position because it can be affirmed now that these operations are not prejudicial to either physical or psychic life of the patient, and also that recovery or improvement may be obtained frequently in this way.

Certain symptoms have been observed following the intervention in the prefrontal area, both on the neurological and on the mental side, and these have been discussed both in my book and before the Neurological Society of Paris. However, these disturbances are transitory and none of these symptoms has persisted beyond a few days or weeks. Two or three of the patients in my first series have remained somewhat apathetic but even in these

* Tentatives Operatoires dans le Traitement de Certaines Psychoses, Paris, 1936, Masson et Cie.

cases there is some doubt as to the effect of the operation, because the personality of the patient was not very well known before the operation.

The procedure as first developed consisted in the injection of alcohol into the subcortical white matter of the prefrontal area but subsequently sections were made in the subcortical white matter by a leucotome with a steel loop, tending to crush the white matter a little in this area. At the present time we are using a leucotome with a steel band that cuts rather than compresses, and this has given great satisfaction.*

The present technique is also slightly different from that of the early operations. The trephine openings are made a little farther posteriorly, that is about 1 to 1.5 cm. in front of a vertical line passing through the base of the tragus, and 3 cm. to either side of the midsagittal line. The leucotome is introduced to a depth of 4.5 cm. in an anterolateral direction, the loop is opened and the instrument turned so as to cut a core about 1 cm. in diameter in the white matter. The blade is retracted into the instrument which is withdrawn one centimeter and a second core is cut at 3.5 cm., and finally a third at 2.5 cm. from the surface of the brain. No tissue is removed. The leucotome is then withdrawn entirely and re-introduced in an anteromesial direction to a depth of 4 cm. where the first section is made, withdrawn 1 cm. in order to cut a second core at 3 cm., and a final section is made at a distance of 2 cm. from the surface of the brain.

The cores are cut at two different depths in the anterolateral and anteromesial direction for two reasons. In the first place the angle in the lateral direction is wider and the white matter lies farther below the surface; and in the second place, in separating the distances between the cores there is less probability that a single cavity will be formed at least as far as the two superficial sections are concerned. There would be no likelihood of this occurring in the deep sections, but if these two cores came together in the superficial region, the fasciculus from the paracentral lobule to the medial and posterior portions of the prefrontal lobe might be injured. The destruction of this fasciculus brings about certain vesical disturbances that may sometimes be quite severe even though they are only transitory.

* The leucotome is made by Gentile et Cie. of Paris.

In this article I do not wish to emphasize the technical details described in the monograph, but I do wish to pay tribute to the splendid cooperation of the neurosurgeon, Dr. Almeida Lima. Furthermore I wish to draw attention to the modifications that have brought us better results. In this new technique I have seen only minor and temporary disturbances referable to injury of the frontal lobes, the sphincter disorders have been avoided, and except for certain ocular signs (sluggish pupils, anisocoria) that last only a few days, all the other symptoms that I previously described are rarely observed. The explanation probably lies in the use of the cutting leucotome.

I am now attacking the prefrontal lobes more extensively, making six cores on each side. Not only have the complications been fewer, but the clinical results have been better.

Eighteen patients were subjected to operation in the second series of cases (I previously reported 20 cases). The patients have been drawn from the mental hospital directed by Prof. Sobral Cid and from the clinic of Dr. Diego Furtado at Telhal. We can already draw one conclusion both from the first attempt and from the later operations. Deteriorated patients obtain slight or no benefit from the treatment. Nevertheless one of the cases described below had lasted for five and a half years. In more recent cases, even in those diagnosed schizophrenia, clinical recoveries have been observed. Some of the patients have left the hospital and have resumed their usual occupations. This article presents a summary of the clinical observations on three patients from the Bombarda Hospital directed by Prof. Sobral Cid whose cooperation I wish to acknowledge with thanks. By means of these summaries the diagnoses may be arrived at and the treatment evaluated.

Report of Cases.

Case I.—B. V. J., female, aged 36. Family history: The mother was hysterical and attempted suicide when she found that her husband was seriously ill. Personal history: The patient was well until the time of marriage at 27 years. She had a miscarriage, and two daughters born at term. In the Belgian Congo where she went with her husband, she became sad, interested in nothing, and incapable of running her household. Her husband said he would have to send her back to Lisbon and this made her very angry. She attempted suicide twice, by hanging and by swallowing sulphuric acid. During the voyage she threw her clothes overboard and a knife was found hidden beneath her pillow.

She arrived in Lisbon in January, 1931, very anxious, expecting horrible events. Everything that happened around her was directed toward her person and her situation. She was sure of the truth of her ideas. At first she was confined to a nursing home and returned after some time to her own home without improvement in her mental status. Her daughters were in school and the patient believed that the school had been destroyed in a conflagration and her daughters burned up; the letters that they wrote her did not come from them. The patient was agitated and was admitted again to the Bombarda Hospital. There she was perpetually anxious, with great lamentation, resistive, sometimes hysterical, and her mood was depressed. She was oriented as to place and surroundings but disoriented in time. She always watched closely what was going on around her in order to defend herself from imaginary dangers. She thought the nurse belonged to a sect that would persecute her. The blood that she thought she saw was the blood of her daughters who had been killed. She was always waiting for somebody to come and kill her. She made attempts at flight. She blamed herself for the misfortunes of her sister. She said that the sister had been assassinated in the hospital when she came to visit the patient, that she herself was surrounded by bad women, etc. When her condition improved in the hospital she was allowed to go home on a trial visit, but during this short period at home she was agitated and fearful that somebody was coming to kill her. She re-entered the hospital in the same condition four days after her departure. Her situation remained substantially the same during four years.

In summary: The patient showed a systematized paraphrenia with chronic delusions of persecution. At the onset there was depression, change of character, suicidal attempts; later on anxiety, excitement, delusional state, with fear of imminent danger, despondency, and then physical persecutions radiating from herself to the persons of her family. There was a tendency toward isolation, and toward flight, motivated by her delusional ideas.

She was referred to the Hospital Santa Marta May 9, 1936, very agitated. She was immediately operated on under avertin anesthesia by Dr. Almeida Lima according to the technique described. The next day she was more tranquil. On the 12th she felt well; "It's all over. I've been locked up now for five and a half years but I wasn't crazy. I want to go back to live with my daughters."

May 16 she was observed by Prof. Sobral Cid who found her in good condition although possibly a little reticent. She would not admit, at least frankly, that she had been insane. The family found her in excellent condition, just as she had been before the psychosis. She left the hospital and now after six months she remains in entirely normal condition.

CASE II.—J. R. G., aged 36, police officer. In the family history it is noted that an uncle had epileptic attacks. In his personal history there were frequent nosebleed but no alcoholism nor syphilis. In 1928 after working in the sun all day the patient had insomnia and in the following days psychomotor agitation developed; he wished to escape, to jump out of the window, to attack people who restrained him; but he became calm after some

luminal and warm baths. He walked about constantly although slowly, and stopped eating. After a few days trembling, anxiety, and following this, psychomotor agitation developed and he was admitted to the Bombarda Hospital. Status on June 28, 1928: disorientation as to time and space, retardation in replies always preceded by movements of the lips, sometimes mutism, stereotyped movements, inexpressive face and refusal of food; uncertain, swaying walk, the trunk bent forward, the head flexed; waxy flexibility. Later on there were periods of excitement alternating with shorter periods of apathy and mutism. He never responded except in monosyllables and in a low voice. He remained in this state until October 28, 1928, when he left the hospital in custody of his brother. The patient improved outside the hospital and during seven years he remained in good health. He performed his military service and finally joined the police force where he had a good record.

In 1935 he developed gonorrhœa and accused the doctors of having poisoned him, and of having conspired together to do him harm.

He again entered the hospital July 26, 1935, in a very agitated condition, tearing his clothes with his teeth, beating his head against the pillows, swinging his arms and legs violently about, in spite of restraint. He wept aloud, crying: "You're robbers. You want to kill me and my whole family. The doctors want to assassinate me without letting anybody know about it." He was well oriented in place and time. He replied slowly or not at all to questions. The temperature was a little elevated on account of generalized furunculosis but subsided when this was cured. The patient remained, however, in a very disturbed state.

In February and March, 1936, he still showed the same agitation. He continued to tear his clothes with his teeth. He threw himself out of bed without any precaution. He ran about, he jumped, he cried, he wept, he repeated his complaints in stereotyped fashion but he was not violent toward others. There was no fever and there seemed to be considerable organic deterioration.

His condition seemed to warrant the diagnosis of schizophrenia. He was transferred to the Hospital Santa Marta March 21, 1936, and operated upon the same day under avertin anesthesia, prefrontal leucotomy being performed according to the technique described.

The agitation of the patient diminished immediately after the operation and disappeared completely in three days. On April 9 the patient was in good condition, talked relevantly and coherently, and was correctly oriented. He desired to go home in order to resume his work. He was sent to the mental hospital where he was observed by Prof. Sobral Cid who considered him well and permitted him to leave April 12. Information obtained recently indicates that he is maintaining his recovery now seven months after operation.

Case III.—J. J. S., aged 36, newsboy. The family history was negative. The patient had sold newspapers since his childhood. In 1922 he suffered from alcoholism and auditory hallucinations and hunted about for people whose voices he heard. "But I was never able to find them." Ideas of

jealousy were present but not severe enough to be termed délusions. The patient improved after a month but shortly after that he returned to excessive drinking and in April, 1935, had an attack of delirium tremens of short duration. Following the development of auditory hallucinations there was marked anxiety and psychomotor agitation. He cried out that he believed in God, that his thoughts were being influenced, that he wished to be let alone. He heard voices that menaced him and made him afraid. These voices incited him to injure others but he did not wish to give his soul to the devil and on that account did not harm anyone. He beat on the walls to make the voices go away. He poured water on the floor because the voices told him that there was no water present, etc., and he showed insomnia and marked anxiety. He struck his wife and children because, as he said, they wished to poison him. He continued to sell the papers but did this badly. He often abandoned his work to go to various churches. He locked himself in a room isolating himself from the family. He ate in various places away from home, always saying grace over his food before taking it.

One day he drew his money from the sale of papers during the preceding month and took it to an unknown place. He was committed to the Bombarda Hospital July 8, 1935.

General and neurologic examinations were negative. He was calm on entering the hospital but when he found out that he was committed he demanded his discharge, saying he was well and wished to work. There was good rapport, and he replied readily. He was oriented in place and time. His attitude was that of a person listening for someone. He confessed that he heard voices and he was convinced that spirits entered into his body. He said, "They talk, talk, but I don't understand at all what they are saying. I want to sleep but they won't let me. They come to me by radio." When asked if these voices spoke of his wife he replied, "Yes. Some say that she is not my wife, others say that she is acting badly, that my children are not my children; but, nevertheless (he added) things that I don't see I can't swear to." The patient made crosses on his chest, on his head, etc., saying they were stars; he went through stereotyped movements with his arms, and sometimes when he was sitting he would rise and take a turn or two around the room before sitting down. He employed incomprehensible neologisms. On one occasion he took off his coat and jumped into the fish pond. He always gave puerile explanations or made irrelevant remarks concerning his gestures and movements. The Wassermann reaction in both blood and cerebrospinal fluid was negative. In spite of this he received antisyphilitic treatment and gained weight, but the hallucinations and the disturbed conduct persisted. On November 4, 1935, he was reticent in regard to his auditory hallucinations. He was unsociable, walking slowly from one side of the room to the other. He picked up and placed in his pocket pieces of wood, nails, twigs that he tore off from the shrubs in the garden. On one day he attacked an attendant saying that the attendant was persecuting him, and he had to be restrained. He continued to assault this attendant and to say that the attendant was going to kill him.

During his stay in the hospital he received his wife and children with indifference but he ate what was brought to him.

The diagnosis was hebephrenic dementia præcox which appeared to be pursuing a chronic course. He was transferred to the Hospital Santa Marta where a leucotomy was done July 10, 1936, according to the technique described above: three sections anterointernally and three anteroexternally in the white matter of each prefrontal lobe. The next day the patient was a little less agitated than formerly. On the 15th he was more tranquil but his statements in regard to his home and his affairs were still inaccurate. He did not give sufficient indication to permit the examiner to know whether he was still having auditory hallucinations. The condition of the patient improved during the following days. He had never confessed, in spite of the solicitation of his wife and of the resident physician of the hospital, where he had placed the money that he had withdrawn a few days before his commitment, but six days after the operation when he was asked about this in the presence of his wife he replied that he had entrusted it to the woman who supplied him with the newspapers. Since his wife was not sure of this information, the patient said, "That's true. She is a lady of high character with whom I would trust much more than that." At my request the wife hunted up this lady and she came immediately to the hospital bringing with her the money that she had deposited in the bank for the patient.

On the first of August it was noted that the patient was getting along well and we were convinced that the hallucinations of hearing had disappeared. We wished to send him to the hospital to be examined by Prof. Sobral Cid but the patient considered himself cured and he was sent home. We saw him most recently November 11 altogether well and he had already undertaken his usual occupation.

Summary.

Following this exposition I do not wish to make any comment since the facts speak for themselves. These were hospital patients who were well studied and well followed. The recoveries have been maintained. I cannot believe that the recoveries can be explained upon simple coincidence. Prefrontal leucotomy is a simple operation, always safe, which may prove to be an effective surgical treatment in certain cases of mental disorder.

ON THE RELATIONSHIP OF THE SUDDEN WITHDRAWAL OF ALCOHOL TO DELIRIUM TREMENS.

By PHILIP PIKER, M. D.,

The Alfred M. Stern Assistant Professor of Psychiatry, University of Cincinnati Medical College.

The method of withdrawal of alcohol from chronic alcoholics has been long subject to debate. Despite the present tendency among most clinicians to practice complete, abrupt withdrawal, there are still a large number who advocate cessation of drinking by means of gradually diminishing the quantities taken. The latter group contends that abrupt withdrawal is likely to precipitate acute alcoholic psychoses, most frequently delirium tremens. The rationale advanced by both groups has thus far been diversified, and has been characterized by more or less casual theorizing rather than by scientific proof. Whether it is more dangerous to withdraw abruptly from the organism a substance to which its physiologic processes have become habituated, or whether it is more harmful to continue administering to that organism more of the substance which has already adulterated its tissues and impaired its functions has remained a debatable issue.

We have the opportunity, at the Cincinnati General Hospital, of seeing and treating a large number of cases of delirium tremens. It was our feeling that a search into the drinking habits of these patients might throw some light on the relationship, if any exists, between the rate of withdrawal of alcohol and the development of the delirium tremens. The brief report which follows has to do with our findings in this connection, and the conclusions resulting from this investigation.

Every patient who recovered from delirium tremens on our wards during the three-year-period from July 1, 1932, until July 1, 1935, was carefully questioned regarding the time that he ceased or markedly diminished his intake of the alcoholic drinks in which he had been indulging recently. An attempt was made also to discover the time of onset of the full-blown delirium tremens. The relatives

and friends of the patients were likewise interrogated, in those instances in which relatives and friends could be found, concerning these two details—the time of cessation of drinking and the time of onset of marked physical and mental symptoms in the patient. Included in this survey were only those patients regarding whom the information obtained seemed reasonably accurate.

The approximate elapsed time between the patient's cessation of his excessive indulgence in alcohol and the development of his attack of delirium tremens was calculated, and the cases were grouped as is shown in the following table:

No. hours between drinking and D. T.	0	7-12	13-24	25-48	49-72	73-96
No. cases	205	18	10	31	5	6

The temporal divisions in this table were decided upon in a purely arbitrary fashion, and are included here merely because an occasional reader may find a point of interest in the varying lengths of the interludes in those cases where interludes existed. Whether a patient developed delirium tremens one day or four days following his removal from alcohol, however, is not pertinent to the point of this paper.

It will be noted that of the 275 cases in which adequate information was obtained 205 (74.5 per cent) suffered the onset of delirium tremens while still drinking. Of the 70 (25.5 per cent) cases in which an appreciable interval existed between the marked diminution in drinking and the occurrence of delirium tremens, 30 cases presented coincidental complications of sufficient severity in their own rights to produce general impairment of physiologic function. If these complicated cases are eliminated from consideration for the moment, there remain 40 uncomplicated cases which devoloped delirium tremens after they had abstained from drinking for an appreciable period of time. Measured against the background of the total number (275), these 40 make up 14.5 per cent of the entire group.

It is difficult, on first glance, to resist the temptation to utilize these statistics to demonstrate that a chronic alcoholic definitely is more likely to bring about an attack of delirium tremens by continued drinking than by the abrupt cessation of the use of alcohol. Further consideration, however, indicates that these figures alone

hardly justify any such dogmatic opinion. It is true that we may safely assume that the great majority of cases of delirium tremens developing within a given area (greater Cincinnati), among the individuals comprising the lower economic strata of the community, are seen by us on our wards. We do not know, however, the facts regarding that group of chronic alcoholics which does not develop delirium tremens and which therefore does not come under our observation—whether most of these individuals, when they stop drinking for a time, do so gradually or abruptly. Without this additional information, the statistics thus far stated do not permit of final interpretation.

Nevertheless, the discrepancy in our group of cases is so marked that we hesitate to stop at this point. Fortunately we have at our disposal two additional facts, which, in our opinion, when considered together with the above data, help us to decide which of the two methods of withdrawal is more effective; or, to put it in a negative fashion, is less likely to prove harmful. Jelliffe and White [1] state that in England in the year 1907, of 63,000 inebriates jailed, 246 (less than one-half of 1 per cent) developed delirium tremens. Here indeed is an observation based on a considerable mass of material which argues against the notion that sudden deprivation is a significant factor in the etiology of delirium tremens. In addition, it is our habit at the Cincinnati General Hospital [2] to include abrupt and complete withdrawal of alcohol in the régime under which our patients with delirium tremens are treated. Using this régime, we have been able to reduce both the duration of the disease and the mortality rate to levels well below the average reported from other clinics, in a good number of which the method of gradual withdrawal was incorporated into the treatment.

Discussion.

It has been pointed out that of the delirium tremens cases admitted to the psychiatric division of the Cincinnati General Hospital, the disease developed in a definitely appreciable majority of patients while they were still drinking heavily; that of 63,000 drinkers who perforce stopped drinking suddenly, the number who developed delirium tremens was extremely small; and that the sudden enforced abstinence from alcohol in patients with delirium tremens

did not prevent a definite improvement in the results obtained by our treatment. The combination of these three facts would seem to point to but one conclusion: that the sudden cessation of drinking is not likely to cause or to prolong delirium tremens. In addition, it suggests that in attempting to treat delirium tremens rationally, the method of choice should include abrupt withdrawal of alcohol.

Many clinicians have advanced other arguments in favor of this opinion, *e. g.*, that individuals who have developed delirium tremens after voluntarily ceasing drinking stopped induging in alcohol only because the impending disease had as one of its prodromal symptoms a distaste for alcohol, or because the prodromata frightened them into abstinence, and so on. These points are not particularly clear cut, and depend to a large extent on the subjective opinions of the patients. This paper has been concerned with purely objective observations which permit of a minimal range of interpretation. That they have been observations of an entirely empirical nature is not to be denied. An experimental approach to the problem would be, of course, more satisfactory. We plan to attack the problem from the experimental angle as soon as possible.

Conclusions.

I. Empiric observations are presented which indicate that abrupt withdrawal of alcohol is not likely to cause or prolong delirium tremens.

II. It is recommended that the treatment of delirium tremens include abrupt withdrawal of alcohol.

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CLINICAL STAFF CONFERENCE.

By CHARLES F. READ, M. D., Elgin, Ill.

The state hospital clinical staff conference has become so accepted a part of hospital routine as to run serious danger of becoming a ritualistic manœuver without vital significance. It is easy for a staff physician to listen in with a modicum of attention and attest to his presence with a confirmatory " I agree " when asked for an opinion upon the case under consideration.

The story is told that an excellent assistant superintendent once commented upon the fact that the staff members, when he first took up his duties, held so many divergent views concerning the cases brought into conference as to make matters a trifle difficult. However, after he had been acting for a time he noted that there developed a much better agreement as to diagnosis, treatment, etc.; and thus harmony prevailed.

A group of six, eight, or ten staff members will do extraordinarily well to meet together several days a week throughout the year under the influence of the same moderator, without reducing their exchange of ideas to a common denominator of psychiatric intercourse. To be sure, the personnel of consultant groups can frequently be shifted about, but there will always remain a rather continuous interchange of ideas which, in the long run, contributes to a considerable uniformity of thinking.

An exchange of staff members between hospitals for periods of six months to a year, might be of value in combating this tendency. Even an interstate exchange of selected men is within the possibility of future accomplishment, an idea suggested by comparison of the percentages of manic-depressive patients admitted by Massachusetts—9.2 of 5554 first admissions, and by Illinois—5.4 of 5307 first admissions. Of course, it is understood that statistical diagnosis is used here merely as an indicator of differences of viewpoint which may well exist in other directions.

The writer has considered the desirability of inviting from time to time various psychiatrists of the vicinity to conduct our clinical conference after their own fashion. However, the nearest psy-

* Read at the ninety-second annual meeting of The American Psychiatric Association, St. Louis, Mo., May 4-8, 1936.

chiatric center is 40 miles away, and the same difficulty would doubtless present itself in 75 per cent of other state hospitals.

Another alternative is that of asking various staff members to conduct the conference from time to time, thus inviting modes of approach which might not be spontaneously proffered.

A final disposition of the problem might be made by abolishing the procedure entirely, or at least reducing it to an informal consideration of cases by the clinical director and the examining psychiatrist. Under ideal conditions such an arrangement might work out fairly well, so far as the patient is concerned, if the director is interested in clinical psychiatry from a therapeutic standpoint.

However, for the purpose of this discussion, we shall assume that a clinical staff conference participated in by a fair number of the staff continues to be a desirable hospital activity.

Proper participation in such consultations in ordinary state hospital practice is an exacting duty. Within 30 to 45 minutes one must closely attend to the reading of the clinical record of the case; consider the patient as he responds and reacts to inquiry; and finally pass a fairly adequate opinion upon what is to be done for an individual whose life experience, together with many other data, has been compressed into a reading time of 10 or 15 minutes. At the best, this is a desperate attempt to deal profitably with material which is obviously inadequate to the demands made upon it. The conference psychiatrist has need of all the concentration he can bring to bear upon a subject at the best but scantily furnished with necessary data. It is exceedingly difficult to make wise allowances for the affect, intent and intelligence of those who have given their story of the patient's life, especially of his childhood development; for the personal reactions and inadequacies of those who have obtained this anamnesis; and even for the involuntary bias of the physician who has made the examination and prepared the records.

Clinical staff conferences naturally serve an educational purpose so far as the medical participants are concerned—no matter how long they have been in the work. Primarily, however, they are consultations, analogous to those for which psychiatrists in private practice receive substantial fees. It is the attitude and performance of skilled consultants which the patient has the right to expect after he has undergone the disagreeable procedure of commitment, plus

the discomfort of the physical examinations and interrogations which go to make up a proper case record. If, after these experiences, the patient is given anything less than a carefull consultation service, he is betrayed.

Unfortunately, few state hospitals, if any, possess adequate medical staffs. Sufficient time can rarely be devoted to the patient's examination. Nevertheless, it is the business of the hospital to carry out the important procedure of the staff conference on as high a level of thought and action as possible. To accomplish this task in a proper manner, various facts must be kept in mind.

In the first place, the examination must at least approach adequacy, which does not always mean that it must be elaborate. In order to make more time for problem cases, a cursory study of certain types, such as addicts, epileptics, paretics, seniles, and old manics and præcoxes, without formal presentation, seems to be permissible when the receiving service is large and the staff quota restricted. We omit so-called alcoholics from this category, because the immediate cause of their commitment is so often a smoke-screen for organic disease, schizophrenia, manic-depressive psychosis, psychopathic personality, or feeblemindedness. Feeblemindedness itself, as a substratum, must always be kept in mind. Patients with a mere grammar school education, or less, should always be suspected and examined, if cooperative, by a competent psychologist with psychiatric experience. It is disappointing, even humiliating, to have the question of native intelligence endowment fairly raised in staff conference when such an examination has not been made.

The patients to be considered should be properly prepared for the occasion by being informed in a kindly manner as to the general nature and purpose of the procedure ahead of them. To lead a patient without warning into a room full of waiting physicians, is unkind and technically bad practice. The place of meeting should be dignified and the demeanor of those in attendance in keeping with the professional purpose of the occasion. An appearance of informality is desirable. A patient placed upon a platform with an audience seated in rows before him, may quite naturally feel like a court witness and behave accordingly.

Presumably the hospital record is read before the patient is introduced. There is a distinct literary opportunity in the writing

of good records, and so too is there an art in the reading of them. Some staff physicians learn to do these things better than do others. If the record is of importance, it should be presented in an interesting manner, with due appreciation of dramatic values where these exist—and usually they can be found. Presumably the conference leader has examined in advance the records of cases to be considered.

When the patient is brought into the conference, the physician presenting the case will see to it that he is put at ease and properly introduced to the conference leader and the group as a whole, with the assurance that this is a friendly gathering of physicians to consider what can be done for his welfare. This formality of course presumes that the patient is in fair contact with reality. Upon the other hand, it is often difficult to estimate just how far an apparent detachment from the environment actually goes. Certainly, it is better to err in the direction of courtesy than to make the mistake of treating a sensitive human being as an insect to be pinned to a card for examination and classification.

There are various ways of going about the delicate procedure of interrogating the patient in staff conference, and one distinctly undesirable method—that of questioning the patient with an air of suspicion mingled with superiority. Too intensive questioning may so confuse, anger, or terrify him, as to alter his general appearance and manner enough to give the consultants quite a false impression. As a general rule, it is unfair to ask intimate questions before a number of people, which the patient may find difficult to answer even in the presence of the examiner alone. The results of such questioning may be misleading rather than helpful. Sex life and interests are most important, but are not subjects for an extensive public inquisition; if more facts are required than the examiner has supplied, these should be obtained in a supplemental private interview.

Unless the conference is to serve largely an educational purpose, the moderator will perhaps do well, to begin with at least, by contenting himself with a limited number of questions—enough to bring out such responses and other reactions as will apparently uphold the examiner's general thesis, or place it in doubt. Following this the other consultants should have an opportunity to make pertinent inquiries before the patient is tired out. Aimless question-

ing is abominable. When the patient has been dismissed the leader of the conference may briefly sum up the salient facts as he sees them, before committing the case to general discussion. At this time it is probably best for him to avoid statements of opinion.

Presumably for the sake of the records a stenographer is present. It is a pity that she cannot be made invisible. Upon the other hand, a clever one can be trained to make running comments and notes upon the patient's responses when these concern solely matters of fact, thus avoiding in part the long series of questions and answers which present such a hopeless array upon many staff conference records. A signal system can be readily devised for informing the stenographer when to make verbatim records, when to summarize and when to make no notes whatever.

In state hospital practice it must be admitted that the first objective of the clinical conference, though not its most important one, is classification for statistical and other purposes. We shall dismiss this subject with the trite remark that square pegs should not be forced into round holes, and that it is not a reflection upon our psychiatric knowledge to leave many patients formally undiagnosed.

Far more important is the necessity of determining what sort of a person has developed peculiar behavior reactions, a procedure which in itself actually constitutes the best sort of diagnosis. Here, the psychiatrist may be said to touch shoulders with the paleontologist, only *back to back,* as it were, since the one starts out with fragments to construct a convincing whole, while the other proceeds from the finished product to discover the parts, the forces, from which it has derived its present structure. A reasonably good early life history—there are seldom excellent ones—is invaluable. A psychoanalytic orientation is most desirable, though a discussion of questionable interpretations should not engulf the entire procedure of the conference.

If possible, a decision must be arrived at as to the eventual outcome of the case. If we are in this attempt correct half of the time, we are, perhaps, doing as well as can be expected. Out of eight to ten opinions conscientiously arrived at, at least one is pretty sure to be right, but which one is the crucial question. In a private consultation the relatives anxious inquiry is not so often " What is the matter " as it is " Will he recover, and, if so, when? "

Obviously, the principal conference objective is the treatment of the case. Here, discussion should reach its height, since each physician, if alert, may contribute a worthwhile opinion from his particular viewpoint. It is here, perhaps, that the psychiatrist in charge of the conference assumes his gravest responsibility, that of determining what recommendations, in view of his own experience, should be acted upon. The character of the hall or cottage to which the patient is to be later assigned, medical and operative procedures, further laboratory work-ups, the character and extent of psychotherapy, occupational and recreational requirements, possible effect of an early parole, etc., are all to be weighed in the balance and a decision arrived at which shall advance the patient's welfare in so far as possible.

Finally, the well-conducted staff conference constantly serves as a school of instruction for all concerned. Here, the younger members, social workers, internes, etc., acquire a working knowledge of the practice of psychiatry, while the more experienced attain broader horizons, together with a certain necessary increase of humility in the face of knotty problems. A conference avowedly held for teaching purposes is actually a clinic and not to be included in the present discussion.

A supplementary procedure at the close of the conference may consist of instructions to the stenographer as to the filing of the case for various purposes. Thus, for example, a single patient may be filed for student clinics on schizophrenia of the paranoid type; may show an interesting endocrinopathy; may be filed a third time because of a Bell's palsy; and possibly yet again as a study in heredity, or childhood maldevelopment.

The writer believes in staff conferences for the reconsideration of continued treatment cases. The consideration of newly admitted cases involves a long section of life history, together with what is often little more than a cross-section of the psychosis itself. In the re-presentation of a case after six months or a year, there is a fine opportunity to compare early diagnosis and prognosis with the progress and present status of that same patient. Such studies are usually an incentive to better and more careful study of the freshly developed case.

The clinical staff conference is one of the most important functions of a state hospital. It is a crucial event in the patient's institu-

tional experience. It is an instrument to be used with an optimistic attempt at precision. As a day by day procedure, there is danger of a ritualistic type of deterioration. Conference leaders should be careful that its practice does not become narrowed or distorted. Hospital superintendents do well to remain keenly aware of its existence. The proper manner in which to accomplish this end is by way of frequent participation in this most important procedure.

In brief, the problem of the conference leader is so to stimulate the interest of the participants as to effect a lively discussion based upon the discriminating judgment of all concerned. In this way, and in this way only, is mediocrity to be avoided and the best interests of the patient served.

DISCUSSION.

DR. FRANK F. HUTCHINS (Indianapolis, Ind.).—The conference is probably one of the most important functions of the hospital. It is well recognized in the state hospitals or psychopathic institutions. We have a large amount of routine procedure which must take place. Many things must go along in a business-like manner. Nevertheless, the staff conference is an important thing in the hospital.

Dr. Read very clearly pointed out it is not necessary for all the patients to pass through such a conference, at least through a conference with a longer period of study.

The staff conference has three great functions, and possibly a fourth one. The first one, of course, is a study of the case, the analysis of the case, for the benefit of the patient. The second great function is for the staff. The third great function is for the cause. The fourth reference I referred to is possibly the treatment function.

I know of no more interesting staff conference than the group study, where there is a great deal of discrimination, a great deal of thought and study, and much diplomacy, a large amount of thought and experience on the part of those participating. If you take a group of cases and bring them before a staff as a group, these patients present themselves, they react upon themselves. They will talk among themselves, and the purpose of the directors is to get them to talk, one with another, and in that way they will begin to get an understanding among themselves that sometimes a doctor himself cannot obtain.

It is well known that most patients recognize in another patient certain defects. The patient recognizes that it is foolishness with the other patient, but he thinks that is not true of himself. In the ward, you know how the patients get together. It is one of the great treatment functions in the hospital. If you get these patients together at a staff conference it is a very illuminating procedure.

The basic thing must be considered as courtesy. I am so glad to hear you speak of the courtesy, the culture and refinement, of presenting these cases. I know of nothing more deteriorating than to allow the dignity of the presentation to be left out. The courtesy of the doctors should be the same as a presentation before a scientific meeting. All the information should be gathered together and presented to the conference before the patient comes in. Let the staff members get all these salient points and salient features of the case. That means everybody, too. That means a synopsis of the whole thing. Then the case can be brought in, and a few of the points demonstrated. As an actual fact, you are not going to do much study of the case at the conference. It must be done previously by the clinicians of the case. After the case has been presented and the salient points brought out, then let the patient retire.

Ordinarily there are certain types of cases that their study will bring to your mind, that are very much benefited by such a conference, patients who should take part in such a conference, patients who will be very greatly interested in what is going on, and even take part in the discussion.

Ordinarily, let the patient retire, and then let the conference take place.

One of the things Dr. Read spoke about is to my mind very essential, and that is to get all the men to take a part in the discussion, not of every case, but of these special cases. Especially the younger men of the staff, through a little modesty, or some other reason, hesitate to take part. It would be wise for those who lead the staff conferences to call on every member to comment upon it, ask him to say something, purely for the training of the staff, because that is the second function of the staff conference.

It is not sufficient for these cases to classify them according to the behavior and for statistical purposes. I am sure you will agree, especially after this reading, that we are on the verge of some wonderful things in psychiatry. Psychiatry is general medicine, gentlemen, to the nth degree.

In a school conference, we have all our interns there, we have all our laboratory men there, we have our biological chemists; we have our psychologists, we have our research workers. The purpose is to ask them to come in before these various patients are brought out. Most of the detailed reports are presented in the synopsis.

After the case is brought out, all the various departments should be called and asked to comment on this case, and we want information. From then on, the case is kept alive, and any questionable conditions, as they appear in the case, are called up at the next staff conference.

It seems to me this is one of the most wonderful things in the hospital. It seems to me the average hospital man feels sometimes we are not exactly kind to him. In going along in the routine work of staff conferences, he gets tired of it. You have to keep the youngsters, especially, alive, and give them the idea of bringing in the chemical reactions, and the basic fundamental conditions and psychoanalysis, all the things which enter into the integration of an individual, which must be brought up in the staff conference if we are to keep the young man going.

DR. GILBERT RICH (Milwaukee, Wis.).—Those of us who have branched out from work in mental hospitals to the mental hygiene work, are struck, of course, by the different type of staff conference we have, and I am afraid often when we visit a mental hospital again, we are rather discouraged with what we find the staff conference to be, after we have had ours; not that the staff conferences in the clinics are all they should be, but I do think there are one or two points that might be of interest and help in the organization of conferences in the hospitals.

There are just two points I want to bring out. One is that the presentation of the case in a conference held in a mental hygiene clinic is not a monologue; it isn't a solo performance by one person. We recognize our patient has been studied from different angles, and we let each person present a different angle, so the conference becomes a clearing house for the information we have gotten together, as well as a consultation before the other people who are present.

We usually have psychologists and social workers. The history of the case, the background of the case, is not presented by the person who examined the patient, but by the person who made the contact, who went out and got the information. If we have a psychologist, that information is presented by a psychologist.

It seems to me where psychological examinations are given, the interest of the staff conference would be very much increased by having those factors of each person's case presented by the person who actually obtained that information, so this becomes the point where all that information is brought together, and where not an opinion prepared by the psychiatrist in charge is presented for the staff's consideration, but where it is worked out, then and there, in the presence of the members of the staff.

Where you know your patient is known outside of the hospital, and that obtains in hospitals outside the urban center, much can be obtained. If the family has been known to a social agency, bring that social worker in and have her present what the family background of the patient is. If the case has been handled by a psychiatrist outside of the hospital, bring that psychiatrist in to tell the development of the patient's psychoses, and so on.

The other point is in the direction toward which the conference should be oriented. It is ideal, as Dr. Read has presented it to us. Treatment is an important thing. We do not reach authority in the clinic, by a great deal. The conferences I have attended in hospitals have been directed almost exclusively, as far as I could tell, to classification. I remember one where we spent five minutes discussing whether the patient had been called one thing or another, and the discussion amounted to the fact that we had better let the doctor talk to him before we let him go.

What Dr. Read brought out is that the treatment should be the center of the conference, and to talk about what you are going to do for him to get well, seems to me very fruitful. You haven't heard many conferences do that.

Dr. Henry L. Klopp (Allentown, Pa.).—I merely want to bring out one suggestion, which I have formulated from my years of experience, to obviate the members of the staff saying, "The same," or "Yes."

Have each member of the staff put on paper his diagnosis, and after that has been entered by the clinical director, if you please, then ask the disagreeing physicians why they disagree with the opinion of the majority. It is interesting to obtain their defense. In that way, you will make progress.

Dr. William M. Bevis (Johnson City, Tenn.).—I am sure I cannot add anything to this splendid paper, nor bring out anything new, but there are a few things that stand out, that have been mentioned, that should be emphasized.

The briefness and the thoroughness of the presentation of the cases having been carefully worked out, with the idea of having it distinctly a consultation; a consultation for the staff and a consultation for the patient, a consultation in which the patient is the center of the session. He should be placed at ease. He should be made to feel that this is no court martial, no court of inquiry for an inquisition of any kind, but that he is being presented in order that the foundation may be laid for his therapeutic treatment, in order that he may have the best opportunity to recover.

As has already been brought up, he should be handled in a courteous, painstaking manner, and encouraged in order that he may take a lively interest in the therapy that is to follow for his benefit.

Dr. Walter E. Lang (Westborough, Mass.).—I have simply one point I should like to bring out. I agree with everything in the presentation of the cases, but in this case of "Yes-men" and in order to force the members of the staff to think for themselves, it has been our practice for many years to call upon a most recent member of the staff for a full expression of opinion, both as to diagnosis and as to treatment, and to call on all the members in the order of their seniority. This causes the newcomers to be definitely on the alert and to formulate their ideas, and not simply to say, "I agree" if some person of longer service previously expressed an opinion.

Dr. Charles F. Read (Elgin, Ill.).—I have nothing particularly to add. I have enjoyed the discussion. I appreciate any suggestions that have been offered.

I am especially excluding from my discussion the urban clinic devoted to special purposes, such as Dr. Rich has mentioned. I fully appreciate the advantage of having people from outside participate, however, and I think it is a pity we cannot have more professional people, sociologists, psychologists, and trained social service workers in these conferences.

THE CASE OF FLOYD DELL.

A Study in the Psychology of Adolescence.

By LOUIS J. BRAGMAN, M. D.

I.

In *Moon-Calf,* the first of his long series of autobiographical novels, Floyd Dell defines adolescence as "that mysterious re-birth of the soul." In this story, the beginning of his ceaseless quest for the meaning of that transitional period, "where the brook and river meet," is fully revealed. For Floyd Dell, destined to endure a painful and protracted period of "growing up," from the ill consequences of which he believes that psychoanalysis rescued him, has emerged, with his own difficulties presumably well in hand, as a pre-eminent psychologist of adolescence.

It is not without cause that the theme of adolescence has engrossed his attention, almost to the exclusion of other interests. For his personal problems, for the belated solution of which he has struggled so many years, acted as the dynamic impulse for his creative output. Disagreeing with the thesis of Otto Rank, who believes that individual will is the sole source of art, Dell, reviewing his own art-products, his poems, plays and novels, is of the opinion that "art . . . . is a pain-saving device," by which the artist sublimates his endurances without the necessity of living them out in disagreeable reality. Burdened with many juvenile complications, unable to transport himself into the adult world, the author day-dreamed his desires into his works. When objectivity finally came, it was seen that he spoke the universal language of youth enchained by his youthfulness. For this is the task of adolescence—to give up, without undue effort, the play-world of childhood.

The adolescent mind, if wrecked on the rocks of reality, becomes tragically schizoid. The adolescent mind, over-protracted and confusedly endeavoring to retreat from the harshness that awaits, is perilously near that same danger. Both adolescent mind and schizoid temperament have much in common: the dreams, the

imaginations, the shyness, the loneliness, the sensitiveness, the overseriousness, the easy embarrassment, the aversion to sports and competition, the predilection for reading and seclusiveness—these so overlap that it is difficult to say exactly where the pathologic begins. In this rebirth of the soul there is a too abrupt shifting of values and demands which can upset catastrophically the unstable or already weakened structure. Puberty is the great crisis, the great proving-ground, and the successful emergence of a balanced young adult is at the most a precarious matter. What were the adolescent problems of Floyd Dell, and to what advantageous uses did he put them?

II.

Moon-Calf, he says, is about "the odd sort of child and boy and youth" he had been. The keystone of his oddness he considers to have been an experience at the age of six. It was Christmas and, because of extreme poverty at home, it was for him a bitterly disappointing Christmas. There were no gifts. His immediate reaction was stoicism; no longer expecting anything good from life, he resigned himself to a fate of suffering in deprivation. Most particularly he lost his father who, because of his manifest financial inadequacy, could surely be no model or hero or influence. He had lost all identification with the masculine world that would make him wish to be a boy. For his mother, to whom he turned the more passionately as "an all-powerful Goddess," becoming his "Ideal Universe," was unwittingly converting him into a "sissy," with his well-cultivated yellow curls and little Lord Fauntleroy manner. He became an exemplar boy, quiet, polite and even-tempered, most dangerous attributes for one entering puberty. "How is he going to become masculine enough in his attitudes to hold a job, or accept a responsible relationship to the other sex?" became the all-important question.

Dreamy, introverted, egotistical Felix Fay, in *Moon-Calf,* is indeed a moon-calf, a dolt, a foolish fellow, utterly unprepared for life with his *fay*-like qualities. He has no interest in boys or the activities of boys. He is girl-shy. He reads constantly, especially poetry, and wants to become a great novelist. Disaster is adumbrated by his prolonged attachment to his mother. She has taught him, encouraged him, fired him with ambition. "Whose opinions

or taste or authority could I rank above hers?" he asks, hardly realizing that he was being blocked emotionally by a disappointed, weary, middle-aged woman. Other influences were inadequate later to break down this training. In school the teachers resembled her: "beautiful and wise and good and firm," but they failed to help him gain moral freedom. For in her he found a safe and comfortable refuge.

At twelve the identification with his mother and the rejection of his father took a different turn. Since the ostensible head of the house was inadequate, he would himself remedy the situation. Whereas he had formerly shown fixed ideas regarding his fate in the midst of poverty, and was ashamed of his home and family, he now began to search "for grounds of emotional reconciliation" with his father. It was not that this parent was lazy or incompetent, but that he was a victim of the capitalistic system. Out of these thoughts arose his ideas of social rebellion. He had earlier written a poem of protest against the very moderate drinking habit of his father; later he was to identify his father in verse with Lincoln.

At eight he had believed that he knew somewhat of the facts of life, although he was unprepared to understand the meaning of autoeroticism. He had built up a moral universe in which he was content to remain. His day-dreams of girl-friends continued long into adolescence, which was free from any sort of sex experience. He sought refuge from the "girl-question," and passed his youth in "scholarly and monkish virtue."

But just as socialism and atheism came with the resolution of his father-conflict, so did the girl-question find an answer in social comradeship. For his mother fixation had definitely brought on the inevitable sex-suppression. He began to write poems of companionship, of love hardly sexual. At eighteen he manifested the purity, the Sir Galahad complex, waiting to find a love affair on terms acceptable to his mind. Still ungrown psychosexually at nineteen, his poems of young Galahad modestly assert that no girl is quite good enough for him. Poem-dreaming of girls, he lets others have affairs with them. At twenty-one his lack of sex adequacy is rationalized characteristically and speciously: "The impersonal, elemental, irresponsible fire of sexual love, when given the privilege or obligation of having no fruition in children or domesticity, could become a kind of passionate friendship, a recognition of the truth

that each was, beyond sex, a person." For he has now found that he could love at a time when he could not marry for lack of money. What is more logical, then, than a temporary establishment, a state of free love, for those really in *Love without Money?*

He detested the thought of prostitutes and longed for a sweetheart in super-idealistic terms, *"That Very Improbable She,* whom one could kiss on the roller-coaster and yet talk to at a Shaw play." Denying any "mawkish ideas about chastity, male or female," he sought a woman balanced by his proportions in emotion and intellect. Woman and sex were not to be taken lightly—sex was a mysterious and sacred theme. Subsequently he wrote on *The Terminology of Sex,* telling of the woman's way of talking about sex, using erudite scientific words instead of the romantic language of love-making. This, he deemed, might ultimately become the accepted language of literature.

A number of affairs followed on the basis of free love, and then at twenty-two he married. But when he attempted to pursue the principle of freedom even after marriage, according to the philosophy which he expounded to Joyce in *Moon-Calf,* his wife rebelled. With regret he gave up the peace and order and stability which he thought he had "so miraculously achieved in marriage." But the poet must have his freedom.

Why could he not obtain the stability he craved? All he desired was to stay mated and to continue to use his literary talents in a useful way. "I wanted to be a father to any children I had, not a romantic begetter who proceeded to wander over the face of the earth in pursuit of some new illusion." Why could not life be as in his play, *The Perfect Husband,* in which husband, wife and lover are all good friends? Or as in *The Idealist,* which expresses his own sincere tendency to keep "sweet and warm one's friendships with women without letting them turn into love." He did not want to fall in and out of love repeatedly, for sex and parting and all that goes with these light affairs affected him seriously.

Ten stormy and baffled years accompanied his marriage, with divorce and life in Greenwich Village as the end. Try as he might to achieve continuity and stability in his work and love-life, he failed, with the conviction that the difficulties were internal. From his reading of Burton's Anatomy of Melancholy, with its manifold absorption in the problems of love, he was led to an investigation of

the works of Freud and his disciples. Psychoanalysis seemed a way out. For he was thirty, had found himself neither in work nor love, and the art of psychoanalysis might possibly set him free, might enable him to " love deeply enough to get married and to have children," and to discover in himself the power necessary for completing his novel.

So he decided to be analyzed, and the work on his novel, " which had already resurrected many buried memories of childhood, made the task easier; so did my familiarity with the technique of ' associating ' words." He offered no resistance, and memories, dreams and associations poured out in a never-ending torrent. Although the analysis was much interrupted and was never completed, he did obtain through it a " new emotional center to life." He wrote better, and tried not to have any more love affairs until his emotional problems were settled, " so I could love with a whole heart." He gained a new view of himself and of the world. He concluded that psychoanalysis generated happiness and self-confidence and a better balance of inner forces. It gave him new powers; no longer was he the blind victim of unsuspected motives.

The next year he married, for the second time. The self-insight he acquired convinced him that now he was on the road to marital happiness. He had now come of age; the psychological revolution made it possible for " young Moon-Calf to enjoy the responsibilities of marriage and presently of parenthood." And, as he wrote in *Homecoming,* he finally became aware that he was not alone in having psychological difficulties in growing-up.

III.

Moon-Calf was written during the beginning of his first marriage. It tells of his early life leading to his departure for Chicago. His second autobiographical novel, *The Briary Bush,* a continuation of *Moon-Calf,* relates the story of his " ten years of struggle to achieve happiness and stability in love and marriage " to " Rose Ann." Both struggled successfully to belong to one another, yet remain free. At the end Felix gives up being a " poetic infant," and accepts his adult responsibilities. But why marry at all, seems the logical question. Because, the author implies, if you are young you must. You must renounce your freedom, and decide that children

are better, more comforting, more pleasing, than theories. Elsewhere the author writes that love makes people illogical, free love is the unreasonable tomfoolery of two adolescents, to be free is to be homeless, and happiness worth quarreling and struggling for. His conclusion is that under the ægis of Freudian science, the intellectual discovery was made that sexual love, parenthood and family life are of fundamental, emotional importance. In *The Briary Bush*, he carries on as a "private person the deep satisfactions of good fortune in marriage and fatherhood." He had gained the courage of love and life. Although belated in his discoveries, he believed that since he had taken so long to learn the simple values of life, he knew them better than others who took them for granted.

The Golden Spike is another *Moon-Calf*, another story of an adolescent, with his idealism, his lack of guile, and his naive viewpoints on sex and other problems. Again he is waiting for the right girl, "holding reason's fort, though waving fancy's banner." Harvey Claymore finds adjustment to life quite difficult. His adolescence is awkward and his maturation erratic. Again is described an unrealistic approach to adulthood, the ineffectual lovemaking, the childish attitude towards little things, the oversentimentalizing, the over-dramatizing, the doubts regarding marriage and paternity, the sexual misunderstandings. Again is seen a man in conflict with reality, who wants a stable marriage, and in it intellectual freedom, yet somehow fails to find either.

This Mad Ideal might be viewed as dealing with the feminine counterpart of Felix. It is the story of Judith's growing up to the age of twenty-one, just as *Janet March* portrays the modern girl against her socio-historical background. Sincere, frank, ambitious, with a tendency towards naturalness as opposed to bigotry and puritanism, Judith seeks a career as a poet and writer. However, she does not want just a "sensible" marriage, but rather one dreamed of, a marriage of ideals. She rebels at the thought of mere respectability and tameness. Is she, in love, and lacking experience, only following mad ideals, not knowing where they will lead her? Conventionality in marriage and all that it implies—is it not bad for young, impractical lovers, taking away their hopes and strivings and confusing them instead? For the career of each one should be worked out fully, in marriage if possible, in living

together unmarried if necessary, or separately, if advisable. Here is retold the story of adolescence, the age that " seemed even more an affair of the soul than of the body."

Immature emotional reactions, and the blind alleys that are reached by under-developed adolescents, are analyzed in *An Unmarried Father.* Norman Overbeck, lawyer, has a decidedly juvenile mind, and reacts in a hopelessly, confusedly, undeveloped manner in endeavoring to escape from his entanglements. Whereas the unmarried mother of his baby is resolute in her decisions, he flounders, afraid or inadequate to face or even evade the situation in an adult way.

Souvenir is the story of Dell's second marriage. He was willing to forget the first with its high hopes that had blundered into failure, despite the secret hurts to his pride and sensitivity. His first wife did not want to be tied down; she wanted a career of her own. After an interval of careless Bohemianism in the Village where it was easier to have love affairs than to work, he encountered his second wife. She represented the stability he had long been seeking, for she was tame and domesticated and contented, the kind of woman men always want. Felix had had a son by his first wife. The son, now nineteen, is the souvenir of his youth; in him he re-visualizes his own emotional reactions. He declares that people were not as afraid to face the facts of human nature as they were in his youth. Sex today is no longer a bugaboo. Marx was not the only prophet—there was also Freud. It was difficult, he said in *Homecoming,* to reconcile the Marxian social-economic and the Freudian psychoanalytical points of view, which he has heroically attempted to do. He was trying to justify his concepts of a permanent love-marriage as against freedom in love.

IV.

Love in the Machine Age is a scientific, historical, socio-economic, psychological survey of childhood, adolescence, love, courtship, marriage and parenthood. It is subtitled: *A Psychological Study of the Transition from Patriarchal Society,* and contains an outline and summation of the themes of the novels and personal experiences of Dell. His parents, he says in effect, did not rear him properly, hence he will point out the defects of the old generation and the

saving grace for the new. The aim of the book is to help parents make use of the revolutionary aspects of modern psychology in the upbringing of their progeny.

Patriarchal training does not fit children for living in the modern world. The father, governing the family by paternal rights, neglects certain fundamental requirements, which would enable the child to attain full adulthood. The patriarchal régime fosters permanent infantile attitudes. The machine age is opposed to this archaic family institution, for it brings liberation from the trammels of tradition, it trains children for psychic adulthood, it equips them properly for love and work. It destroys the harmful effects of the old patriarchal system—prostitution, homosexuality, adultery, arranged marriage, sacred celibacy. It establishes the family on the correct basis of romantic love. Patriarchal education snares the youth, installs false ideas of purity, engenders sex fear, is hostile to free courtship and love-choice, forces its victims into traditional religion and politics, drives them to rebellion, to the solaces of alcoholism and drug-taking, and even to psychoses and suicide.

He says: "We are only beginning to learn to bring up our children so that they may be capable of making their own free and responsible choices in the field of work and love." This, the teaching of modern child guidance, was unrecognized in his day. He failed to acquire the training necessary to prepare him for true heterosexuality, to lead him naturally, easily, into courtship, mating, parenthood and family life. The newer freedom of today was long needed. It could never spring from patriarchal customs which produced neurotics.

"I got my education partly in a public library, and partly in a socialist local, finishing it up by being psychoanalyzed." Ellis and Freud have taught the sources of adolescent difficulties; and popular Darwinism, too, assisted in the breakdown of the patriarchal home, and gave scientific sanction to the emergence of woman into industry as man's economic rival.

Were You Ever a Child? is a treatise on modern education. Sinclair Lewis says that from its comprehension of the mind of the child both Montessori and Froebel might have learned a great deal. Showing a rare aptness and sympathy when writing about children, Dell pleads for the New Education, which must be

revamped according to recent discoveries in economics, anthropology and psychology. Education is more than growing up; it is a growing up "out of the helplessness, the fear, the misery of childhood, which comes only from weakness and ignorance." It means growing up into knowledge and power.

Progressive education must provide a medium of transition between the dream-creations of childhood, and the realistic activity of adult life. If the artist is to enter into these activities, he must not run away. Thousands of people, failing to free themselves sufficiently from the emotions of childhood, fail likewise to attain happiness in work and love. Ordinarily the love-life of the adolescent boy is a series of more or less shocked discoveries that the women upon whom he has set his youthful fancy do not, in fact, measure up to his infantile dreams. One of the functions, then, of education, is to chase this ideal away, "to dissolve the early emotional bond to the parent, by making the real world in general and the real other sex in particular so interesting that it will be preferred to the infantile fantasy."

V.

Why They Pet is a psychological analysis on a practical basis of the pre-sexual emotional life of adolescents. *Do Men Want Children?* answers a question long in his mind, with the conviction that "My emotions are fulfilled by having children as they never were by having theories." *Women as World Builders* is a *Study in Modern Feminism.* His ideal woman is one who is free, not subservient; intelligent and creative. Woman has untold possibilities—she should be liberated to unfold her latent talents; she should not be degraded as a parasite. *Can Men and Women Be Friends?* he asks. Yes—for the influences of the machine age, "so destructive to fixed authoritarian relationships," seem to encourage the growth of friendship between the sexes. Friendship, which becomes a more and more important aspect of marriage itself, also finds a place in extramarital associations.

In *King Arthur's Socks and other Village Plays,* he writes on sex morality, on problems complicating love affairs, on the idealization of true love, on love in relation to work and freedom, on the instability of love, on temporary love. *Cloudy with Showers* deals

with the sex life of modern woman. *Cupid's Holiday* is a poem of "her that is of love unafraid." In these samples of his writings and in many others, he is seeking a formula for love, "order, regularity, stability, comfort, ease, (and) the respect of the community."

VI.

As shown in Dell's book: *Upton Sinclair—A Study in Social Protest,* there are certain parallels in the lives of these two writers. Both were seriously hurt by their fathers' poverty and inadequacy; both retreated early into a dream world as an escape from too painful reality; both developed a "neurotic attitude towards sex." Among life's important problems, writes Dell, is the establishment for young people of heterosexuality, and "psychic emancipation from the home." Both aspired to be poets, for:

"A sensitive child who grows up in an ugly and hateful world becomes something of a poet in self-defense. He has to shut himself in an imaginative world of books and dreams. His natural creative energies, baffled by the obduracy of outward circumstances, will begin to work upon the more plastic materials furnished by reverie. Books and dreams are his natural refuge, and to become an artist his inevitable secret dream."

And both faced marital difficulties:

"From the wordly point of view, a poet's mate should doubtless be an eminently practical and capable person; and from the poet's own point of view she should be by temperament and education able to understand and sympathize with his ambitions."

VII.

In *Critic's Magic,* Dell confesses that what he wished for most in life was frankness, especially about sex. That wish was made in his "pre-Freudian days." "I could not guess," he says, "how much of quaint and childish and tiresome perversity was being repressed by the genteel tradition against which I raged. I could not guess how much of coprophilic dirt handling, of sadistic sexual hatred and cruelty, of mawkish homosexual disgust of life, was to be unveiled in the frank new literature which was to come into existence according to my wish. I had thought of sexual frankness in normal and happy terms—a noble nudity was what I looked for."

It is this aptness for seeing through to the fundamentals of youthful problems that makes Floyd Dell a sound psychologist of adolescence. In *Love in the Machine Age,* in *Homecoming,* in his novels and poems and plays and essays, he points the way, through mental hygiene, for the avoidance of conflicts, and the achievement of stability. Having experienced all the major problems of youth, he proceeds to clarify them for others. His works are the literary representations of his own psychological experiences. One goes to Floyd Dell as to a vital textbook, for information and advice on the art of "growing up."

THE INFLUENCE OF CARBON DIOXIDE IN COMBATING THE EFFECT OF OXYGEN DEFICIENCY ON PSYCHIC PROCESSES WITH REMARKS ON THE FUNDAMENTAL RELATIONSHIP BETWEEN PSYCHIC AND PHYSIOLOGIC REACTIONS.

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Considerable progress has been made during the last decade by the observations of Cannon,[5] Bard,[2] Ranson,[23] and others on the *neurologic* basis of psychic phenomena. We know now that certain behavior patterns are brought about by a discharge over the sympathetic. These patterns are coordinated in the hypothalamus which influences the cortex and is influenced by cortical activity (Bard,[2] Cannon [5]). But these investigations do not contribute to the fundamental problem as to how physiologic and psychic processes are interrelated and whether or not the same factors which determine the course of events on a low physiologic level are equally applicable to those processes upon which "psychic" activity is based. This aspect of the psychophysiologic problem is the subject matter of this paper.

In spite of the fact that Jacques Loeb [18] made the following statements 30 years ago: "The most important problem in the physiology of the central nervous system is the analysis of the mechanisms which give rise to the so-called psychic phenomena" (page 213), and: "The dynamics of the process of association is the true problem of brain physiology" (page 278), very few attempts have been made to subject these processes to a physiologic analysis. There are essentially two different approaches to the investigation of psychophysiologic problems. One, inaugurated by Pavlov [22] and followed up by the behaviorists, is based on "objective" observations and experiments and neglects completely the subjective phenomena which accompany so-called psychic events. The other is used by introspective psychologists and gestalt psychologists. It is based on a study of subjective experience and may reveal some fundamental facts in the organization of percep-

tions, but it seems exceedingly difficult, at least at the present time, to link up these experiences with general physiologic principles (compare the discussion by Herrick [16]).

Although Pavlov's investigations, and those of his successors, have given valuable information on these higher cortical processes, the physiologic mechanism by which even a single association is formed is still rather obscure. In the face of Beritoff's [3] criticism, it cannot be denied that the concepts which Pavlov employs, such as inhibition, are rather descriptive and are devoid of or in contrast with the physiologic meaning which is given to these concepts in other branches of physiology.

This situation may have prompted Sherrington's [25] remark that, "We have to regard the relation of mind to brain as not merely unsolved but still devoid of a basis for its beginning." This extreme criticism, however, seems to be unjustified; but it gives a new impetus to attempts at an understanding of the psychophysiological relationship. A logical beginning would be to establish the dependence of psychic phenomena on physiologic factors by quantitative methods. It seems to be a task of primary importance for this problem to determine the fundamental factors upon which the integrity of psychic processes depends, and to investigate whether any quantitative alteration in any one such factor alters both physiologic and psychic processes.

The investigations of Barcroft [1] have called attention to a number of factors which seem to be indispensable to cortical activity. It seems that any deviation in the internal environment from the norm (Cannon's [5] homeostasis) influences psychic behavior profoundly. These observations are certainly fundamental but only quantitative investigations involving both physiologic and psychic phenomena can establish the thesis that they are dependent on the same factor.

The most promising line of attack seems to be an investigation of the effects of O_2-deficiency on various levels of cerebral integration, since the great importance of oxygen for all life processes and the great sensitivity of the higher parts of the central nervous system to O_2-deficiency have long been recognized. The investigations of Gellhorn and collaborators [8-15] (Spiesman, Storm, Kraines, Joslyn) have shown that such divers functions of the central nervous system as visual intensity discrimination, the latent

period and intensity of negative after-images, auditory acuity, muscular coordination, associations and simple mental tasks (addition of 2 digits, etc.) are impaired under approximately the same degree of oxygen deficiency. Thus, it is possible to study the influence of certain physiologic factors on so-called psychic phenomena, to alter them by varying one such factor (*e. g.,* the O_2-supply), and to predict the results with the same degree of certainty as is possible in regard to the effect of the intravenous injection of adrenalin on the blood pressure. This seems to prove that a separation of physiologic and psychologic processes is unjustified since both depend on, and are modified by, the same physiologic factors.* This conclusion is in accord with Claude Bernard [4] who more than half a century ago wrote: "Il n'y a réellement pas de ligne de séparation entre la physiologie et la psychologie." † Still more interesting is the fact that Bernard clearly foresaw the general approach of the physiologist to this problem, as the following quotation indicates: "Les phenomènes de l'intelligence et de la conscience, quelque inconnus qu'ils soient dans leur essence, quelque extraordinaires qu'ils nous paraissent, exigent, pour se manifester, des conditions organiques ou anatomiques, des conditions physiques et chimiques, qui sont accessible à ses investigations et c'est dans ces limites exacts qu'il circonscrit son domaine. Je pense que c'est là une question que le physiologue parviendra à resoudre." ‡

The problem of the relationship of physiologic and psychic phenomena to each other is of such importance to physiology, psychology and psychiatry that it may not seem sufficient to show that both groups of phenomena are altered when certain physiologic

* This statement is in sharp contrast to Herrick (Am. J. Psychiatry, 93: 249, 1936), who believes that we have two different adjusting mechanisms in our body, one "that works physiologically and a different apparatus that works psychologically," although he states later in the same paper in regard to the relationship of "mind and matter": "These things which are in nature joined must not be torn apart artificially in logic or in practice."

† Physiology and psychology are in reality inseparable.

‡ The phenomena of intelligence and consciousness, however unknown they may be and however extraordinary they appear to be, require for their manifestation organic or anatomic and physical and chemical conditions which are accessible to his investigations. Within these exact limits the domain of the physiologist is circumscribed and I think that this is a question which he will solve.

factors such as the O_2-concentration inhaled by the organism is varied. To establish a fundamental factor such as O_2-deficiency as the cause of physiologic and psychic changes new experiments were carried out in which the effect of CO_2 to compensate O_2-deficiency was studied with regard to various physiologic and psychic processes. Under these circumstances the same quantitative relations hold true for both groups of phenomena, *i. e., the same concentration of CO_2 which offsets the effect of a given O_2-concentration on muscular coordination and visual intensity discrimination reestablishes also complex psychic functions such as memory, associations, and simple arithmetical operations, etc., at normality.*

Basic to these studies were the observations of Mosso,[21] Margaria,[19] and recently Childs, Hamlin and Henderson,[6] who found that small concentrations of CO_2 may increase the resistance of animals or human beings to a lowering in the O_2 tension of the inhaled air. My recent studies on visual intensity discrimination showed that this function decreases rapidly under conditions of O_2-deficiency.[9] But no changes or only slight temporary changes in visual intensity discrimination occur if the experiment is carried out with the same O_2-concentration but in the presence of 3 per cent CO_2.[10] From these observations it seems to follow that the effect of a certain O_2 concentration on sensory functions may be completely offset by small concentrations of CO_2, which in themselves are without any effect on the sensory function investigated. Since this arrangement leads to clear results, it seemed appropriate for application to the so-called psychic processes.

Material and Methods.

The experiments were carried out on 15 male students aged from 20 to 27 years. The experimental procedure was the same as in the preceding paper, that is, the gas mixtures were prepared by means of a Sargent gas meter, and frequently analysed. The subjects inhaled them from Douglas bags. Each of the students was acquainted with the procedure from previous experience with O_2-deficiency experiments in which sensory functions were investigated. After they had inhaled the gas mixtures for 5 minutes, 50 stimulus words of the Kent-Rosanoff [17] test were given and the associations were written down immediately after each stimulus word had been given verbally. The analysis of these responses

followed the principles given by Kent-Rosanoff which were explained in detail in a preceding paper (Gellhorn and Kraines [12]). In one group of experiments the subjects inhaled a certain air-nitrogen mixture containing, usually, 8.5 per cent O_2; in a second experiment they inhaled a gas mixture with the same percentage of oxygen, which contained, in addition, 3 per cent CO_2. Control experiments showed that 3 per cent CO_2 alone did not alter the association processes.

The records obtained from these association experiments were used also for an investigation of the effects on handwriting of O_2-deficiency with and without 3 per cent CO_2. This was of interest since the influence of O_2-want on handwriting has already been noted by McFarland,[20] Wespi,[26] Gellhorn,[8] Christensen and Krogh,[7] and others. The test reveals even slight disturbances in muscular coordination and permits of a comparison of the effects of O_2-deficiency on motor coordination and association in the same experiment.

In order to aid in interpreting the responses given by the subjects the observer discussed the results with them two or three minutes after the experiments were carried out. In one such experiment it was noticed that the experimental subject did not recall any of the answers given, nor did he recognize his own handwriting. This prompted an investigation of memory under O_2-deficiency with and without the presence of 3 per cent CO_2 in a very simple experiment. Three minutes after each association test was concluded a memory test was given by asking the subject to read his own responses and to recall the stimulus word which was given in the preceding association test. Finally two tests were applied in which the influence of O_2-deficiency with and without 3 per cent CO_2 could be studied on the time necessary to carry out some simple mental tasks. The first test (referred to as number cancellation test) involved the cancellation of the number 4 from a text containing numbers in an arbitrary sequence, the second the addition of two single digits, as used in Kraepelin's test.[11] In order to reduce the time for writing the result the subject was advised to write only the last digit of the resulting sum in case the result was 10 or more. In both tests the subjects were thoroughly trained until the time in the control showed only very slight variation with practically no errors (compare Gellhorn and Joslyn [11]).

Results.

A. Associations.

In Fig. 1 the results are shown graphically by the ratio of the distribution of responses in all experimental subjects, the numerator representing the responses obtained under O_2 deficiency in the absence of CO_2 and the denominator the responses under the same conditions with the addition of 3 per cent CO_2. Fig. 1 shows also two graphs from the paper of Gellhorn and Kraines [7] for comparison. One represents the control experiments in which the ratio of the distribution of the responses is shown when the first and the second 50 stimulus words were given while the subjects breathed air; the other indicates the ratio for the O_2-deficiency experiments when compared with controls in which the experimental subjects were exposed to air. It is obvious from the graph that a shift toward the individual responses occurs in both groups of experiments. In other words, it seems to be immaterial whether the effect of O_2-deficiency is compared with the control obtained by breathing air or with the control obtained by breathing an oxygen deficient gas mixture containing 3 per cent CO_2. That the results are statistically significant is indicated by the x^2 test and the statistical probability is stated in the following figures.

$$x^2 = 11.60$$
$$P = 0.01$$

The results are, therefore, in full accord with those recently obtained in a study on the visual intensity discrimination. It may be concluded that 3 per cent CO_2 is sufficient to restore ordinary sensory processes as well as complex association processes to a normal level.

This contention is further strengthened by the determinations of perseverations and dissociations in the two groups of experiments. As was found in the preceding investigation with Kraines, the number of perseverations was markedly increased in the O_2-deficiency experiments (122)* and much smaller (80)* in experiments in which CO_2 was inhaled simultaneously with the O_2-deficient gas mixture. This increase of 50 per cent is of the

* The figure is the sum total of perseverations observed in all experiments in the two groups.

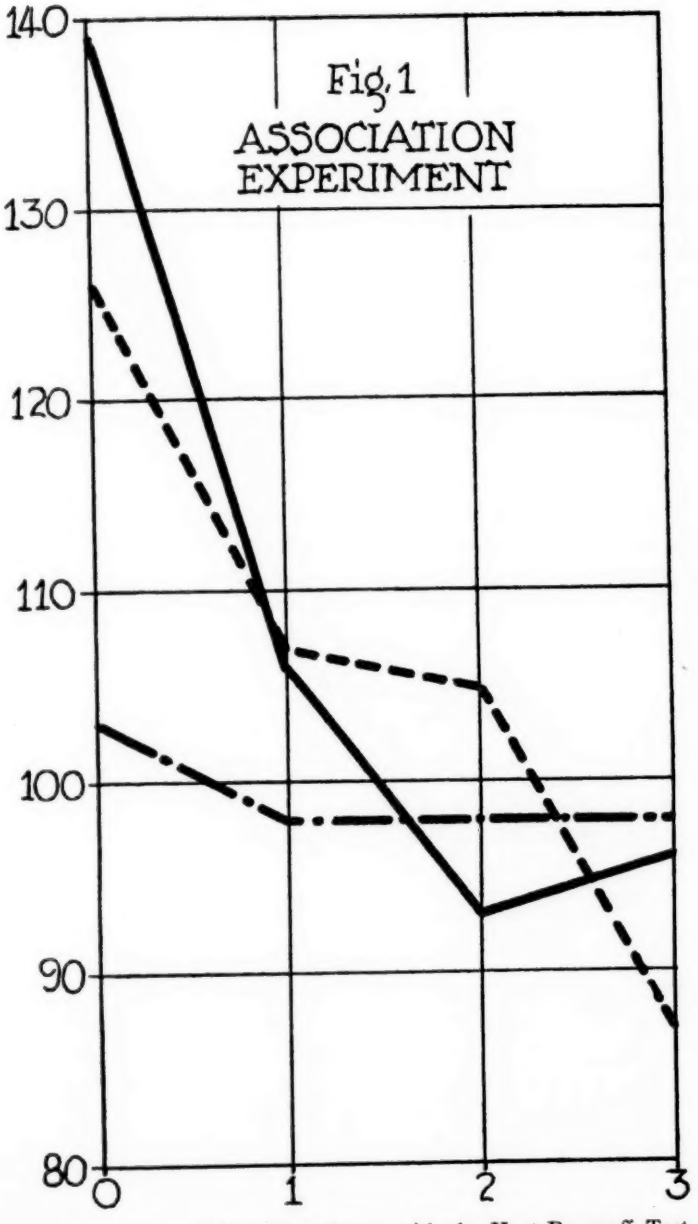

FIG. 1.—Association Experiment with the Kent-Rosanoff Test.

Ordinate: Change in usualness of response between the first and the second fifty words expressed in the percentage of the former.

Abscissa: O = individual responses; 1, 2, 3 = responses with the frequency 1-15, 16-100, and more than 100, respectively.

— · — · — Control.

———— Ratio of $\frac{\text{responses to } 8\frac{1}{2} \text{ per cent } O_2}{\text{responses to } 8\frac{1}{2} \text{ per cent } O_2 + 3 \text{ per cent } CO_2}$.

- - - - - - Ratio of $\frac{\text{responses to } 8\frac{1}{2} \text{ per cent } O_2}{\text{responses to air}}$.

same order of magnitude as found in previous experiments in which the effect of O_2-deficiency was compared with the results obtained when the subjects inhaled air. The result is similar in regard to dissociations. In the experiments with 8.5 per cent O_2+3 per cent CO_2 no dissociations occurred, whereas 13 dissociations were observed in the corresponding 8.5 per cent O_2 experiments. Among these were found clang associations, as in "head"—"had." In one case the repetition of the word used in the preceding reaction occurred. In others no clue could be found to the reason for the choice of the response.

B. MEMORY.

Memory tests as described above were carried out on 11 subjects (Table I). It is obvious that memory in the presence of CO_2

TABLE I.

MEMORY TEST.

	O_2-lack		O_2+CO_2.		
Subject.	O_2-concentration, per cent.	Memory,* per cent.	O_2-concentration, per cent.	CO_2-concentration, per cent.	Memory, per cent.
K	7.7	60	7.7	3	82
J	8.5	19	8.5	3	76
B	8.5	13	8.5	3	85
St	8.5	0	8.5	3	80
Bo	7.5	4	7.5	3	66
L	8.5	28	8.5	3	62
M	8.5	24	8.5	3	66
Mc	8.5	70	8.5	3	92
R	8.5	76	8.5	3	81
H	8.5	12	8.5	3	65
Y	8.5	18	8.5	3	60
Mean		29.4			74.1

* The figures indicate the percentage of stimulus words which were remembered upon reading the reaction word.

is good as compared with that observed under the same degree of O_2-deficiency in the absence of CO_2. The individual differences seem to be due to the fact that the "critical" O_2-concentration varies somewhat. This is brought out by the experiments in Table II in which the same subject was submitted to two such experiments on O_2-deficiency with and without 3 per cent CO_2. The experiments were carried out at an interval of about 3 months,

thereby eliminating the possibility of retention from the preceding experiment, although the same 100 words were used in both experiments. Table II indicates that the reduction in the O_2 concentration may be without effect in the presence of CO_2, but may reduce memory profoundly in the absence of CO_2. It shows also that the concentration of O_2 which causes a considerable reduction in memory is variable. In the experimental subjects B, J and H, 8.5 per cent O_2 led to a great reduction in memory, whereas memory was practically intact at this concentration for the subject Bo. This subject, however, confirms the general rule concerning the

TABLE II.

MEMORY TEST.

	O_2-lack		O_2+CO_2.		
Subject.	O_2-concentration, per cent.	Memory, per cent.	O_2-concentration, per cent.	CO_2-concentration, per cent.	Memory, per cent.
Bo	8.5	74	8.5	3	84
	7.5	4	7.5	3	66
H	9.0	80	9.0	3	90
	8.0	46	8.0	3	92
B	9.5	76	9.5	3	88
	8.5	13	8.5	3	85
J	9.5	50	9.5	3	70
	8.5	19	8.5	3	76
H	9.5	70	9.5	3	84
	8.5	12	8.5	3	65

differences of the effects of O_2-deficiency with and without 3 per cent CO_2. It was necessary only to reduce the O_2-concentration to 7.5 per cent in order practically to extinguish memory in the absence of CO_2, although it was nearly normal in the presence of 3 per cent CO_2.

It is interesting to note that in the few responses in which the memory remained intact under O_2-deficiency the association is of an emotional character. This is comparable with clinical observations (Rieger [24]), according to which in certain cases of aphasia numbers can be used correctly only in counting money.

C. HANDWRITING.

Figs. 2a and 2b represent the results of a mild case of O_2-deficiency. In the record obtained under the influence of 8.5 per cent

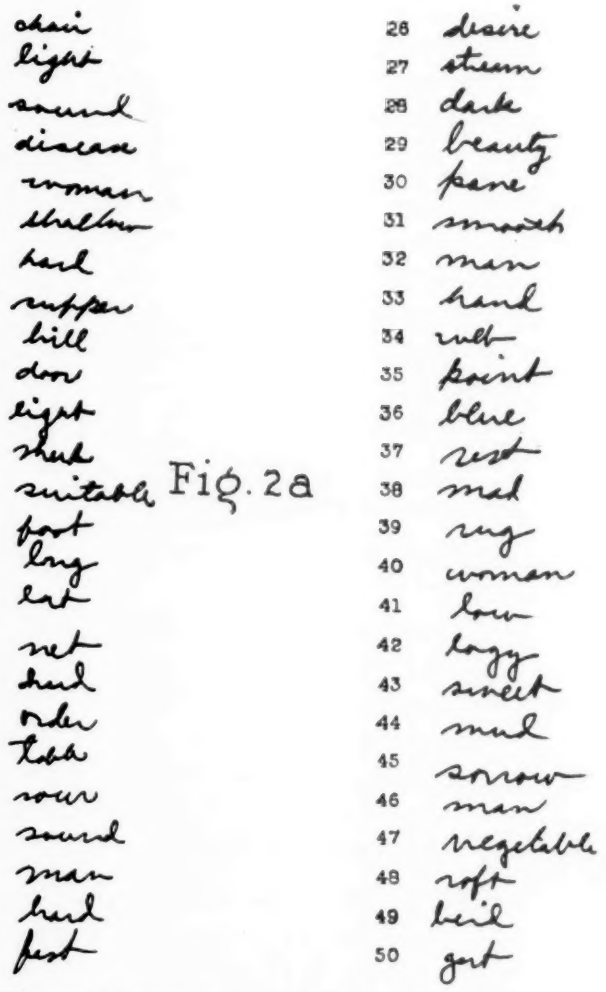

Fig. 2a

Fig. 2a. Effect of $8\frac{1}{2}$ per cent $O_2 + 3$ per cent CO_2.

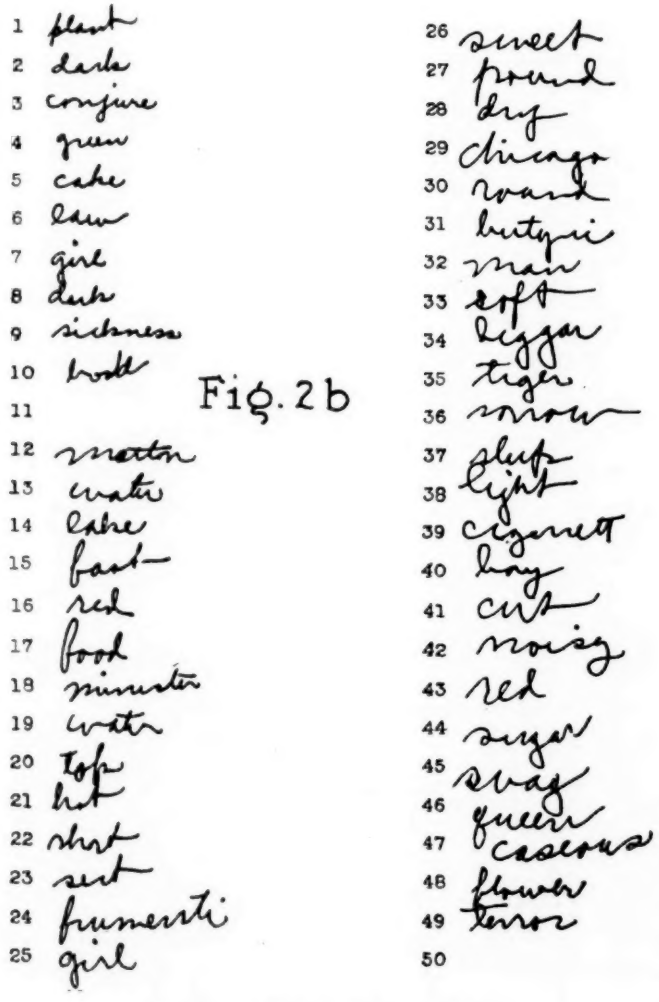

Fig. 2b

Fig. 2b. Effect of 8½ per cent O_2.

FIG. 2.—Association Test on Subject R. J.

Fig. 3a

Fig. 3a. Effect of 8½ per cent O_2 + 3 per cent CO_2.

Fig. 3b

Fig. 3b. Effect of 8½ per cent O_2.

FIG. 3.—Association Test on Subject Bl.

1 chair
2 room
3 box
4 isolation
5 woman
6 narrow
7 hard
8 apple
9 valley
10 top
11 cat
12 leg
13 bed
14 finger
15 long
16 apple
17 moth
18 rough
19 order
20 leg
21 dandy
22 train
23 dress
24 ~~train~~ cellar
25 train

Fig. 4a

26 bone
27 deep
28 room
29 woman
30 glass
31 surface
32 United States
33 print
34 Black widow
35 point
36 color
37 night
38 wrath
39 room
40 ~~[illegible]~~ young
41 wall
42 men
43 apple
44 universe
45 arrest
46 sailor
47 salad
48 bed
49 beak
50 pump

Fig. 4a. Effect of 8½ per cent O_2 + 3 per cent CO_2.

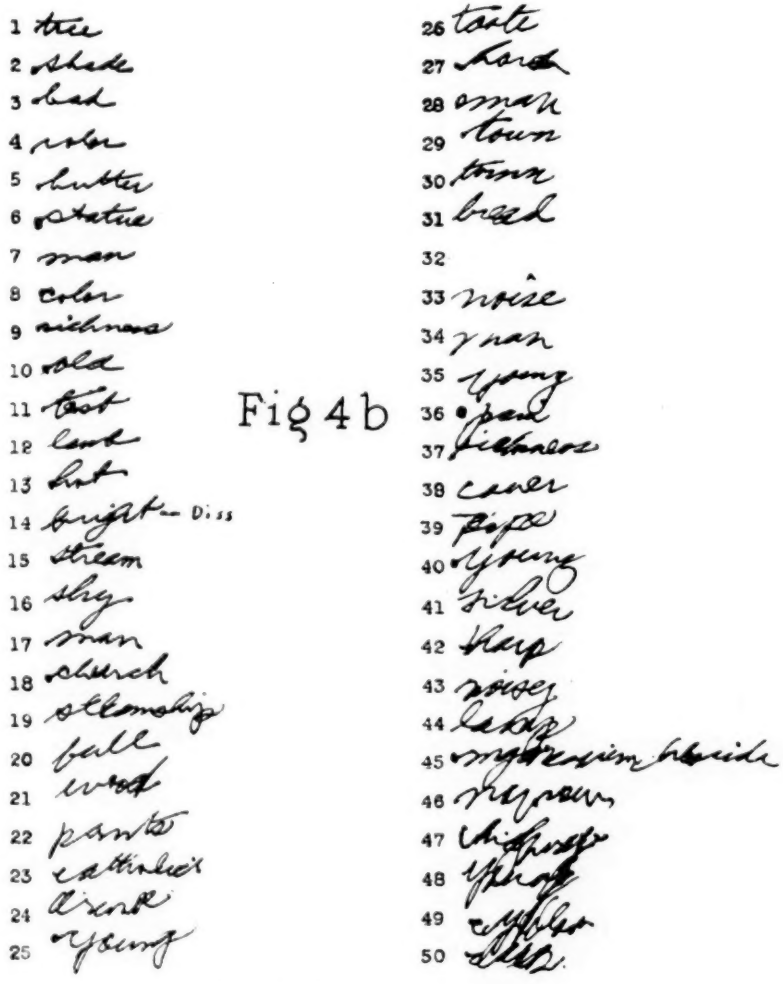

Fig 4b

Fig. 4b. Effect of 8½ per cent O_2.

FIG. 4.—Association Test on Subject W. A. Y.

O_2 there is an increase in the size of the letters—an indication of some degree of muscular incoordination. At the same time words are misspelled, as in no. 39 "cigarrett" (cigarette). The corresponding experiment under 8.5 per cent O_2+3 per cent CO_2 shows a complete absence of any changes in handwriting or spelling. Even in this case, in which the change in handwriting is comparatively slight, it is sufficiently great to change the essential characteristics so that the experimental subject was unable to recognize his own handwriting.

Figs. 3a and 3b are examples of a moderate case of sensitivity to O_2-deficiency. Here one sees an increase in the size of the individual letters. Moreover, the strokes are much heavier and the handwriting is extremely clumsy. At the beginning of the words one sees not infrequently several attempts before the correct letter is formed. The writing itself is performed much more slowly than normally. The effect was not restricted to the time of O_2-deficiency, but continued even after readmission of air as, for example, when, on account of rather severe symptoms, air was readmitted after response no. 96 had been given, the handwriting remained clumsy for some time after. Misspelling occurs not infrequently. Compare no. 75, "younk" (young), no. 89 "cigateret" (cigarette), and no. 97 "emprer" (emperor). In spite of these definite changes the handwriting remained normal through the whole experiment when 3 per cent CO_2 was administered with 8.5 per cent O_2.

The record of subject Y (Figs. 4a and 4b) represents a severe effect of O_2-deficiency. During the experiment, as the figure shows, the incoordination became progressively more severe, and at the end of the experiment the words became entirely illegible. It is remarkable that, in spite of this complete lack of coordination, the cortical processes underlying the formation of associations are still largely intact. For instance, in no. 45 the subject answered to the stimulus word "salt" with the response "magnesium chloride." Here again the corresponding control experiment, with 8.5 per cent O_2+3 per cent CO_2, shows that the handwriting remains unchanged under these circumstances. The experiments prove conclusively that even severe degrees of muscular incoordination, as shown by the records of handwriting, are completely absent if the same concentration of O_2 is inhaled together with 3 per cent CO_2.

D. NUMBER CANCELLATION AND ADDITION TEST.

The investigations were carried out on eight experimental subjects. A typical result of the experiments on number cancellations is shown in Figs. 5a and 5b. It is obvious that under the influence of O_2-deficiency, as was described previously by Gellhorn and Joslyn,[11] the time necessary to carry out the number cancellation test is greatly increased. The effects are completely reversible immediately after readmission of air. These changes are absent if when the same degree of O_2-deficiency is used 3 per cent CO_2 is inhaled.

The results with Kraepelin's addition test are similar. Figs. 6a and 6b show a slowing of the addition process under 8.5 per cent O_2, but practically no changes under the influence of 8.5 per cent O_2+3 per cent CO_2.

GENERAL COMMENT.

First, may be discussed what subjective phenomena were observed under the influence of O_2-deficiency with and without 3 per cent CO_2 and how they were related to the objective findings reported in this paper. The subjective phenomena observed under O_2-deficiency consisted mainly of headache, dizziness, fullness of the head, sometimes weakness, paresthesia—particularly in the hands and feet, and alterations in vision and hearing. The objects in the room seemed to have a pinkish color and the voice of the experimenter seemed to come from a greater distance. In the corresponding experiments carried out in the presence of reduced O_2+3 per cent CO_2 the subjective symptoms were greatly reduced or even completely absent. It must, however, be emphasized that the phenomena observed cannot be explained as being due to a nonspecific effect of a general feeling of discomfort since no relationship was observed between the severity of subjective symptoms and the severity of the changes recorded in the various tests studied in this investigation. Occasionally one may find decided changes in the various cortical functions which have only a very slight, if any, counterpart in the subjective complaints of the experimental subject.

As to the relationship of word associations, memory and handwriting, the following statement may be made. The most sensitive of the processes shown to be influenced by O_2-deficiency is memory.

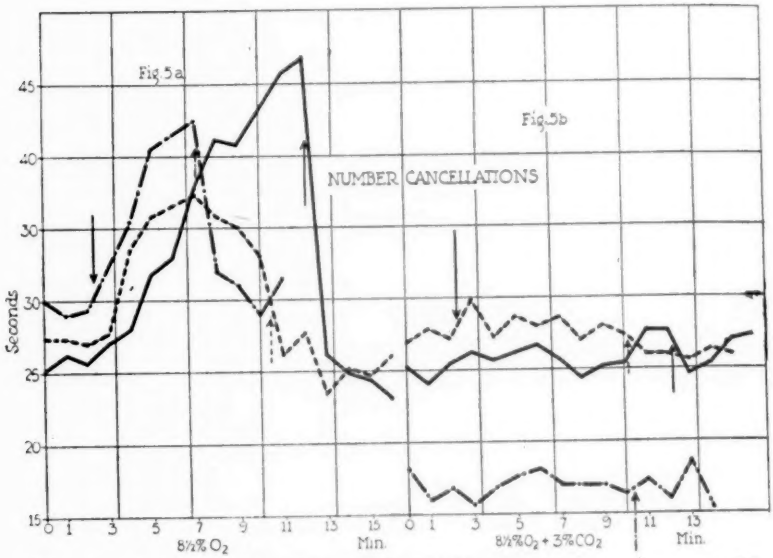

FIG. 5.—The Effect of 8½ per cent O_2 and 8½ per cent O_2 + 3 per cent CO_2, Respectively, on the Cancellation of a Number (Bourdon Test).

Ordinate: Time in seconds necessary to carry out the test; abscissa time in minutes. The gas mixtures indicated on the graph are inhaled between the arrows.

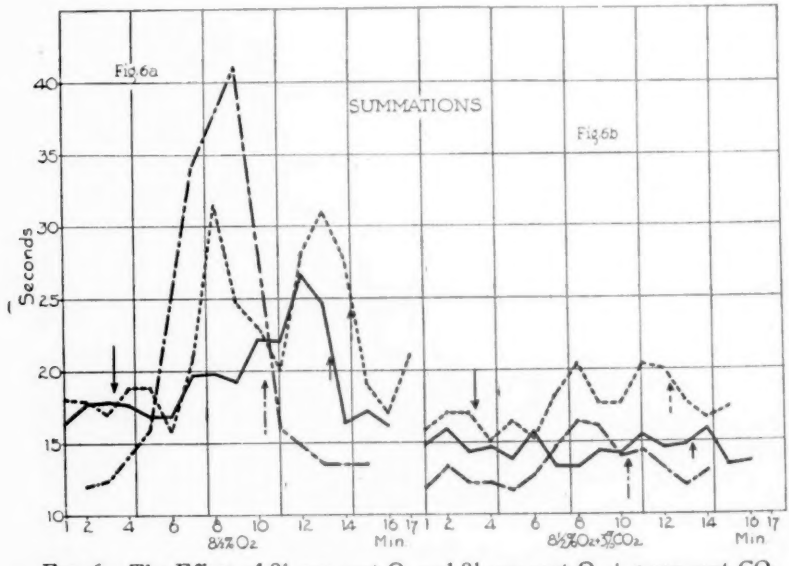

FIG. 6.—The Effect of 8½ per cent O_2 and 8½ per cent O_2 + 3 per cent CO_2, Respectively, on the Addition of Two Digits (Kraepelin's Test). Designations as in Fig. 2.

Characteristic differences between the record obtained under O_2-deficiency with and without CO_2 may be present even when no change in handwriting and no alterations in the type of associations are observed. When the effect of O_2-deficiency is more severe it is shown not only in the great deficiency of memory but also in the changes of associations described, in misspelling and in lack of muscular coordination as revealed by the handwriting test. There is no definite relationship between the disturbances in muscular coordination and the changes in association processes. Occasionally my records show severe ataxic writing with normal associations, whereas in other cases associations are greatly altered (increased number of individual rseponses, perseverations and dissociations), but no marked change in handwriting is found. It is of interest that in a few cases no increase in time in the addition test is observed under the influence of O_2-deficiency, whereas the same O_2 concentration causes a distinct loss in sensory excitability as measured in hearing and vision experiments carried out on the same experimental subjects. Frequently the idea has been expressed that the more complex functions are more easily injured under O_2-deficiency. That is shown, for instance, in the fact that the choice reaction time is greatly lengthened, whereas the simple reaction time shows only slight changes (MacFarland [20]). It seems, however, that this conclusion needs modification. The cases in which sensory functions were disturbed but the addition test did not show change speak against its generalization. The same is true when one finds, as already mentioned, that the association process may be normal in a person whose handwriting, because of lack of muscular coordination, has become absolutely illegible. It is difficult to suggest what may be the reason for the behavior in these relatively uncommon cases. It is not impossible that under the influence of a voluntary effort sympathetic discharges occur, thereby improving the circulation and in the last analysis the oxygenation of the brain. This effort syndrome seems to be evoked more easily if the subject has to fulfill a certain task as rapidly as possible than in an experiment on the threshold of various sensory functions in which the attitude of the subject may be more passive.

It must however, be borne in mind that anything which may be said with regard to the relative sensitivity to O_2-deficiency of the various functions studied in this paper has only a tentative value.

No attempt has been made to analyse such complex functions as memory, etc., since the main purpose of this investigation is to show the parallelism in the changes induced by O_2-deficiency in functions involving very different degrees of cortical integration. The result of these investigations makes it now possible to study various complex cortical functions under conditions involving changes in the internal environment and to attribute directly these changes to the fundamental factors which have been altered. On this basis a physiological analysis of the elements which make up complex psychic functions may be possible.

Conclusion.

If it is remembered that the great sensitivity of the cerebral cortex to oxygen deficiency is known from many experiments in human subjects and animals, and that definite disorders in sensory and "psychic" processes result from an insufficient oxygenation of the brain, it may be stated that sufficient oxygenation of the cortex is indispensable for the normal course of any cortical activity. The present investigations have shown that the presence of 3 per cent CO_2 alleviates sensory and mental disturbances produced by a certain degree of oxygen deficiency. This result, then, warrants the conclusion that ordinary physiologic processes, such as muscular coordination and sensory acuity, which are based on cortical activity, depend on and are modified by the same fundamental physiologic factor (oxygen) as are more complex processes, which in terms of popular psychology are attributed to "the mind." The fact that the two groups of physiologic activities may represent different levels of integration is immaterial with respect to this statement. The common ground which both groups of phenomena have makes the "mind" a suitable object for experimental investigation in the sense of Claude Bernard.

Summary.

A systematic study was undertaken to investigate to what degree the inhalation of CO_2 combats the effects of a certain degree of O_2-deficiency on more complex cortical processes. It was shown that the typical effect of O_2-deficiency on the association process, consisting in the increased number of individual responses and the

occurrence of perseverations and dissociations, is completely absent in the same experimental subjects when the same O_2 concentration is inhaled in the presence of 3 per cent CO_2. The results with regard to memory are similar. Memory is greatly reduced under O_2-deficiency, but practically normal in the corresponding experiment involving the same degree of O_2-deficiency + 3 per cent CO_2. Severe changes in handwriting and misspelling occurring under O_2-deficiency are described. They are absent if the same O_2 concentration + 3 per cent CO_2 is inhaled. The time needed to carry out the number cancellation and addition tests is increased under O_2-deficiency but no such change occurs if under the same circumstances 3 per cent CO_2 is inhaled together with the oxygen-deficient air-N_2-mixture.

In general, it is found that memory is the most sensitive process suffering from O_2-deficiency. As to the relationship to each other of the other processes studied, it may be stated that occasionally muscular coordination, as shown by the handwriting test, is greatly interfered with in spite of the fact that the associative response appears unchanged, whereas in other subjects the disturbances in associations are more pronounced. The characteristic subjective phenomena observed under O_2-deficiency are more or less absent in the corresponding O_2-deficiency experiment with 3 per cent CO_2.

The experiments prove conclusively that the complex " psychic " processes described in this paper depend on, and are modified by, the same physiologic factors which determine ordinary physiologic functions.

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THE CORRELATION OF OXYGEN-DEPRIVATION WITH INTELLIGENCE, CONSTITUTION, AND BLOOD PRESSURE.

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The occurrence of physiologic and psychologic changes in high altitudes has been recognized for centuries, but actual measurement and description of these changes were not attempted till the middle of the 19th century. In 1862, the meteorologist Glaisher and the balloonist Coxwell made a famous ascent. In 48 minutes they reached an altitude of 28,000 feet, when Glaisher found that he could no longer read his thermometer or watch. His arms and legs were paralyzed and his neck so much so that he could not hold up his head. He could vaguely see Coxwell, but could not speak. He became blind though he stated that, " I was still conscious and my brain as active as in writing these lines." He suddenly lost consciousness, but his partner was able to bring the balloon down and consciousness was regained in seven minutes, after which he first heard words and then began to see the instruments. Coxwell did not lose consciousness, but noticed Glaisher's condition and tried to pull the valve rope. He found his own arms paralyzed but managed to take hold of the rope with his teeth and opened the valve. Not so fortunate were Tissander and two companions who made a similar ascent in 1875. They carried small bags of oxygen with them. Tissander at 26,000 feet reported that a condition of stupor overcame him. " Body and mind became feebler, little by little, gradually and insensibly. There was no suffering. On the contrary one feels an inner joy. . . . . I soon felt so weak that I could not turn my head to look at my companions. My mind was still clear, however, and I watched the aneroid with my eyes fixed on the needle which soon pointed to 280 mm. Hg. (or 28,000 feet). I wished to call out that we were now at 8000 meters but my tongue was paralyzed. All at once I shut my eyes and fell down powerless and lost further memory." The balloon continued to rise and the automatic recorder showed a height of 30,000 feet.

When Tissander recovered an hour and a quarter later, the balloon was descending rapidly and both of his companions were dead. It was clear that they did not try to use the oxygen bags until it was too late; and they were then so paralyzed that they could not raise the tubes to their lips. Doubtless they were convinced that they felt all right and in full possession of their faculties.

In both of these descriptions, the loss of consciousness followed paralysis of muscles, and to the end the "mind was still clear." This is contrary to what is assumed today, that the higher centers, the cortical functions are impaired first.

Paul Bert, in 1878, presented almost conclusive experimental evidence that the symptoms due to high altitude depended not on the decrease in mechanical pressure, but on the decrease in the partial pressure of oxygen. He carried on extensive experiments with human and animal subjects, both with artificial gas mixtures, and with reduced barometric pressures in a steel chamber. He showed that breathing air containing 10.5 per cent oxygen at sea level pressure had the same effect as breathing ordinary air at an altitude of 20,000 feet, where the pressure is reduced to half that at sea level. Succeeding experiments did not shake this proof. Haldane, and Lutz and Schneider showed that when the barometric pressure is reduced to the point of production of symptoms, these symptoms could be removed by the administration of oxygen without changing the pressure. This seems to eliminate the influence of lowered mechanical force. That mountain sickness is primarily due to excess blowing off of carbon dioxide (Mosso) or to prolonged fatigue, lack of training, insufficient diet, etc. (Longstaff) was shown to be incorrect when these factors were controlled in steel testing chambers (Barcroft, *et al.*). Nevertheless, Haldane, Kellas and Kennaway stated that although the alveolar oxygen pressure at a barometric pressure of 380 mm. would be the same as if air were breathed at ordinary atmospheric pressure and containing 9.8 per cent oxygen, the effects of the air at the lower pressure seemed less deleterious than the effects of 9.8 per cent oxygen at normal pressure. This they attributed to the slight resistance in breathing from a bag, and to the fact that at low pressures the diffusion of oxygen molecules within and into the lung alveoli is much more free.

That psychologic factors are involved has been shown by Haldane and Kellas. They entered a steel chamber and the air was pumped out until the pressure reached 320 mm. Hg. (24,500 ft.). At that point Haldane's mental reactions became so impaired that he could no longer write or make observations. His reply to all questions was "Keep it at 320." After an hour and a quarter persons outside the chamber became anxious and put messages up to the window, but Kellas only smiled and Haldane gave the same answer, "Keep it at 320." At last Kellas raised the pressure to 350 mm. (21,500 ft.) and Haldane, as his capacities began to return, took up a mirror to examine his lips, looking, however, at the back instead of the front of the mirror. The pressure was then raised to 450 mm. (14,500 ft.) and Haldane's mind cleared. He was entirely unaware of the passage of the hour and could not remember anything that had occurred during this time. "A curious experiment this: Two men of scientific eminence shut up in a chamber with mental faculties so crippled that neither could stop the experiment. Haldane conscious but unable to make scientific observations, and repeating the phrase 'keep it at 320,' although the pressure was far below that, and Kellas grinning through the glass and writing down everything, but unable to appreciate that the man from whom he was taking orders was incoherent, and continuing routine observations on an experiment already gone too far." Barcroft spent six days in a glass chamber in which the partial pressure of oxygen varied, corresponding to altitudes from 10,000 to 18,000 feet. There were minor changes in the performance of simple mental tests of memory, multiplication and discrimination. He could not make the necessary discriminations in gas analyses, yet could carry out clear commands if they were given for each moment. There was distortion of judgment and value, and matters of vital importance appeared trivial. Lawson gave five subjects tests for speed of sorting, speed of tapping, accuracy in aiming, substitutions, analogies, distorted sentences and the same-opposite test. He noticed that the average alterations in behavior were not significant until the percentage of oxygen reached 50 percent of the normal, but at that point the changes were rapid and pronounced. All subjects noticed difficulty in reading at the lower percentages, due chiefly to impaired comprehension and concentration, as well as to physiologic disturbances such as headache.

Tanaka gave similar tests and found that the deficiency in mental and physical work is due chiefly to oxygen lack as a consequence of diminished pressure, that there were great individual differences, that the effect is more marked in the mental than in physical work, that there is a critical point where a sudden change occurs (at about 428 mm. Hg. or 15,000 feet), and that the quality of the work is most affected, *i. e.*, greater fluctuations occur in the accuracy of performance than in speed.

Gellhorn and Spiesman studied the effect of oxygen lack on hearing and vision. Their subjects were trained to a point at which there was a constancy of results, and then submitted to the deficiency of oxygen. They demonstrated a definite measurable decrease in auditory acuity, a change in various visual functions (duration of after image (Gellhorn and Spiesman); visual intensity discriminations (Gellhorn)) and no change in the number of nystagmoid movements (calorific ear test).

All these effects were observed at levels below 10 per cent oxygen (approximately 20,000 feet) and practically no changes were found with concentrations of inspired air at or above this percentage. This leads to the conclusion that in short period experiments (from a few minutes to an hour) there was decreased sensitivity of cortical structures (of hearing and seeing) with less than 10 per cent oxygen, but relative insensitivity of the brainstem reflex as shown by the absence of change in the nystagmoid movements.

In the study of cortical activity Wespi found alterations in the type of associations and a prolongation of the reaction time to oxygen deprivation. Gellhorn and Kraines, utilizing the Kent-Rosanoff association test, found marked individual variations, but as a rule there was a definite increase in the individual type of response, a marked tendency toward perseverations, and the production of dissociations strikingly similar to those occurring in psychotic patients. These phenomena increased in severity with decreasing percentages of oxygen inhaled.

Purpose and Method of this Experiment.

Several problems suggested themselves:

1. Do the cortical or subcortical functions respond as quickly, more quickly, or less quickly to oxygen lack. Inasmuch as Gellhorn and Spiesman found changes in hearing and vision below 10 per

cent, and none above, this percentage of oxygen may be used to test cortical functions. A test for purely cortical (conscious, intellectual, higher) functions seemed to be available in the army alpha "intelligence" test. The short form devised by Wells and Atwell was found to correlate highly with the full test, and could be given in less than 15 minutes. Further, it was found by Richardson and Robinson that when the various forms of the test (there are 5 forms, which are identical in the form of the query but differ in the words or numbers used) were given on successive days, the scores remained essentially the same. If the averages of the individual scores on the first day are taken as 100 percent the averages on the second day are 105 per cent and on the third day 106 per cent. Thus it is possible to use one form of the test as a control, and another form of the test for the experiment.

2. Since it is possible by this method to determine the change in score of the individual subject under varied conditions, the greater the drop in score under anoxemia, the more vulnerable the organism may be considered. This vulnerability might correlate with Kretschmer's types. Kretschmer spoke of cyclothymes who are of pyknic type, and present well-rounded smooth reactions to stimuli, and who have broad and long-lasting variations of mood. The "opposing" group he called the schizothymes; they are essentially asthenic in build, with marked sensitivity to stimuli, and often with short, jerky instability of mood and activity.

A vast literature has grown up on the subject of leptosomes and pyknosomes, in relation to reaction to disease. Atendi and his coworkers found slight differences in the reactivity of the circulatory system of asthenic and pyknic persons. Marinesco and Kreindler in studying chronaxia were able to distinguish three types of reaction to fatigue; the pyknic, which showed a sharp drop in the curve, the athletic which showed a sharp drop also but with certain variations, and the asthenic with a comparatively flat curve. T. Herz, working on 30 patients, injected epinephrine, pilocarpin and atropine. Here also he found three types of reaction, varying with Kretschmer's three types of constitution. In our problem an attempt was made to correlate the degree of psychic vulnerability (drop in army alpha score under oxygen lack) and the type of constitution, as measured by the Weight/Height ^{3} and Wertheimer-Hesketh Indices.

Technic.

The technic of the experiment was: The gases to be breathed were made up in proper percentages by allowing nitrogen and oxygen to flow through a gas meter. It was found, however, that a great deal of time was consumed in filling Douglas bags (rubberized cloth bags which could contain 4 cubic feet of gas); hence a series of flow meters was devised according to the suggestion of Dr. Paul Smith of the University of Illinois (Chart 1). By this

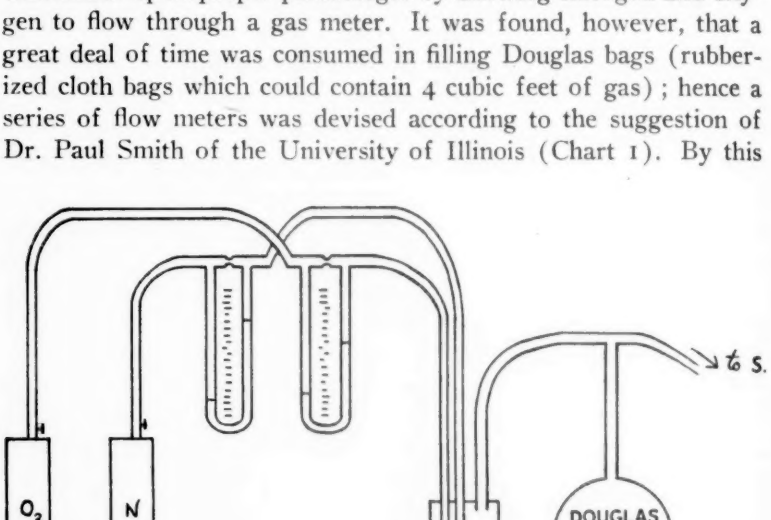

Chart 1.—The amount of gas passing through the flowmeter bears a definite relation to the pressure recorded in the manometer tubes. The manometer was calibrated by keeping the amount of nitrogen passing through constant, and varying the pressure of the oxygen. Repeated gas analyses confirmed the accuracy of this system. The gas was thoroughly mixed over water, and passed to the subject. A Douglas bag was interposed to provide for fluctuations in respiration.

means the flow of the desired percentage of air could be continued indefinitely with a considerable saving of time. In both the control and oxygen lack experiments the subject was connected to a Douglas bag by a long tube of the type used with basal metabolism machines, and his nose was closed by a soft rubber clamp. One-way valves permitted the escape of expired air. The subject was seated at a table and performed the test in writing. The apparatus did not interfere with vision. The time of the entire test was about 16 minutes, the subject being allowed to breathe the mixture for one minute before the test was started. The standard directions for giving the test were followed.

There were 30 subjects, all male medical students, of ages ranging from 20 to 24 years. Physical measurements were made on all. The students were told that they would take the test while breathing oxygen mixtures and were not informed as to which test was the control. The experimental setup was kept constant for the control and test conditions. In order to counteract the possible effect of training, the control experiment (breathing ordinary air) was given first, routinely, so that any decrease in score observed under oxygen lack would be in spite of any learning curve, even though such training effect is improbable in view of the work already reported. Ten per cent oxygen was used in all cases.

Results.

In all 30 cases, with one exception, there was a drop in the army alpha score with 10 per cent oxygen. The initial scores for this short form of the army alpha ranged from 78 to 120. The scores under oxygen deprivation ranged from 39 to 103. There were marked individual variations, however, and decrease in score (as against the control) ranged from minus 1 to minus 56. Similarly, there were marked variations in the number of errors made. While breathing diminished oxygen, 5 cases showed fewer errors, 2 cases the same number of errors, and 23 cases an increased number of errors. Of the seven cases without increase in the number of errors, five showed a comparatively small drop in the total score (from 1 to 7 points). The increase in number of errors in general paralleled the decrease in score (correlation of $0.49 \pm .138$). In table 1 is given a detailed analysis of the scores. It will be observed that the degree of decrease varies with each portion of the test. In 2, five minutes was allowed, in test 4 one and one-half minutes, and in tests 8 and 7 three minutes each. The tests were given in the order named, so that the first test to meet the changed conditions was test 2, and the last, test 7. It is important to note that even after five minutes of oxygen lack in test 2 there was no appreciable drop in score. When totaled the score for the first test under oxygen lack was higher than under control conditions. If one calculates the total number of problems done (score of number correct plus errors) the result is even more favorable during this period of insufficient oxygen. The subjects made higher scores in spite of more errors. Even the subjects who showed the greatest

drop in the final score presented very little change in this first test. The greatest drop occurred as a rule in the last test, given when the subject had been under oxygen-lack about sixteen minutes. Thus it would seem that the condition of anoxemia present in the beginning has been compensated for, but that the compensation tended to fail later owing to a decrease in carbon dioxide in the blood as a result of increased respirations which in the first place is brought about by the deficiency of oxygen intake. The anoxemia undoubtedly was associated with an increased circulation of blood through the cerebral cortex (Schmidt, Schmidt and Pierson,

TABLE 1.

DETAILED ANALYSIS OF SCORES AND ERRORS.

Totals:	No. of errors.	Test 2.	Test 4.	Test 8.	Test 7.	Total.
First scores	253	373	883	849	865	2970
Oxygen-lack scores ..	426	376	708	740	694	2518
Per cent of first score.	168%	100.8%	80.2%	87.1%	80.2%	84.6%
No. of errors in controls.....		68	67	42	75	
No. of errors under 10 per cent O_2		88	134	74	130	
		129%	200%	176%	173%	
No. of attempts (errors plus scores):						
Control		441	1017*	890	940	
10 per cent oxygen.....		461	976*	814	820	
		105%	96%	91.5%	87%	

* Each error in this score has a weight of 2.

Forbes, Gesell and Bronk). Under the test conditions the subjects showed an increase in the rate of respiration at first, which diminished later as a result of acapnia.

Under the conditions of mild asphyxia produced, one is warranted in assuming that there is excessive stimulation of the liver and spleen, so that the number of erythrocytes in the blood is increased (Nice and Katz). This would tend to aid the failing circulation, thus making for an immediate adjustment to decreased oxygen intake by increasing the number of blood cells to carry the available oxygen. When the increase in erythrocytes is insufficient to make compensation and the oxygen poor air continues, the brain becomes reduced in efficiency.

The conclusion, then, seems to be justified that the degree of intelligence (as measured here) under the stress of oxygen lack, depends on the ability of the circulatory system to compensate for a condition of anoxemia.

An attempt was made to correlate the great individual variations in scores under anoxemia with the physical constitution of the subjects. Using the $\frac{\text{Wt.}}{\text{Ht.}}$ index, the correlation was -0.0562 ± 1.81 which establishes no correlation whatever. Using the Wertheimer index:

$$\frac{\text{leg length} \times 100^3}{\text{chest diameter} \times \text{chest depth} \times \text{trunk height}}$$

one finds similarly no correlation. There was also no statistical relationship to the brain weight (as determined by measurements of the skull).

An attempt was made to correlate the intelligence scores under 10 per cent oxygen with the reaction of the blood pressure to diminished intake of oxygen. In order to secure measureable effects, 8 per cent oxygen was used, and the subjects stood during the test, as recommended by Gellhorn. A drop in blood pressure under these conditions may correlate with a relative cerebral anemia. Blood pressures were taken before, during and after the test. The average subject was able to withstand this concentration of oxygen from five to ten minutes without presenting severe symptoms. The systolic blood pressure rose in all cases initially, and tended to fall later. The diastolic blood pressure, in general, followed the systolic blood pressure, but was much less affected. The blood pressure readings were taken every minute. The instability of the blood pressure was determined by adding all variations, up or down, for each successive minute. Of the 13 cases studied, those with the greatest instability in the first three to three and one-half minutes showed the greatest drop in score under 10 per cent oxygen, and vice versa. The 5 subjects whose drop in army alpha scores were -25, -28, -28, -29, and -54, had changes in blood pressure during the first three minutes of 32, 26, 22, 20, and 20, respectively. On the other hand the 6 subjects whose changes in score were -2, -7, -10, -1, -9, and $+8$ showed variations in blood pressure in the first 3 to $3\frac{1}{2}$ minutes of 8, 8, 4, 10, 6, and 8 points, respectively. Two subjects did not show this correlation.

The correlations reported, though small, are nevertheless suggestive and in accord with the expectations mentioned. Persons in whom the blood pressure is unstable would seem to be the ones with relatively inefficient cerebral circulation under anoxemia, and the reverse to be true of those with a relatively more stable circulation.

In viewing the subjects of the test, the clinical impression was that the asthenic persons, as a rule, react much more sharply to oxygen deficiency than do shorter, heavier, pyknic persons. What confuses the issue is that the physical indices of a large group of intermediary and mixed types of persons (which may not be true values of the type of constitution) scatter widely. The only subject to increase his score on the second test was the most outstanding pyknic person of the group. However, many accessory factors enter into the picture. Sawyer and Schlossberg found that cats who were quiet maintained themselves well in from 6 to 8 per cent oxygen concentrations for an hour, but the cats which became excited fainted with these concentrations. In subject G, who scored the greatest drop (-54) under 10 per cent oxygen, there was an intense emotional disturbance. After the first test, 2 (in which he scored fairly well), he signified a desire to discontinue the test and appeared to be markedly apprehensive. He completed the test only on encouragement from the examiner; that he paid attention to his work was seen by the relatively small number of errors he made. Subsequent examination showed him to be under definite emotional tension, not only because of the approaching school examinations, but because of poor scholastic standing and a difficult financial situation. On the other hand, one of the most stable, unemotional and philosophic of the subjects, of typical asthenic build, showed only "-1" in the oxygen lack score. Thus, the factor of stability, inherent or acquired, would seem to play a great rôle in the amount of "cracking" under stress.

There was a slight negative, but statistically significant, correlation (-0.215 ± 0.052) between the drop in score and the initial score. This would mean that the subjects with highest scores on the army alpha test suffered the greatest effects from anoxemia. This correlation may be explained by assuming that brighter subjects grasp the significance of the test at once, and thus the first score was the result of the best efforts, and the oxygen lack score the maximum injury. Subjects with lower control scores, how-

ever, may not have done so well in the first test because of lack of "grasp" of the material; this would be obviated in the second test with 10 per cent oxygen and would tend to counteract the deteriorating effect of oxygen lack.

Another possible explanation of this phenomenon lies in the assumption that more intelligent persons (as measured by this test) are more highly and more sensitively integrated, and therefore, more susceptible to anoxemia, than the less intelligent.

Many subjects who complained of difficulty in thinking and concentration while breathing 10 per cent oxygen, showed a comparatively small drop in the intelligence score, while conversely, some who stated that they noticed hardly any effect showed a marked drop in the score. This is of importance in evaluating the subjective response of persons breathing oxygen under low tensions. That persons "feel" badly, as far as thought capacity is concerned, is no indication of their real capacity at the time.

Summary and Conclusions.

There is a definite drop in intelligence (as measured by the army alpha test) while breathing 10 per cent oxygen (corresponding to an altitude of 20,000 feet). The decrease in score varies greatly with the subject, varying from a minus 1 to a minus 54. Only one subject increased his score under diminished oxygen intake.

The first part of the test showed no loss in score under oxygen lack in spite of the increased number of errors. This is attributed to the respiratory and circulatory adjustments which compensated for the anoxemia.

The subjects with the highest test scores showed the greatest drop in score under oxygen-lack ($r = -0.215 \pm 0.052$).

The increase in number of errors, in general, paralleled the decrease in score.

Subjective evalutions of one's own abilities while under low oxygen tensions are wholly inadequate. Many subjects who thought there was little effect, did poorly and vice versa.

The clinical impression was that asthenic persons showed the greatest drop in intelligence and the pyknics the least to this stress. Nevertheless, the Weight/Height ^{3} Index and the Wertheimer-Hesketh Index did not confirm this impression. There was no correlation with brain weight (skull capacity).

A few preliminary experiments suggest that the drop in intelligence varies with the instability of blood pressure. In thirteen experiments with 8 per cent oxygen, subjects who showed the greatest instability in relation to blood pressure showed the greatest drop in test scores. It is suggested that the efficiency of the cerebral cortex under stress (of anoxemia) is dependent on the ability of the circulatory system to compensate for the diminished supply of oxygen.

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Comment.

DR. MEYER HONORED IN BIRTHDAY FESTIVAL.

Adolf Meyer's birthday party and the beginning of the 25th year of activity of the Phipps Psychiatric Clinic under his leadership was a most inspiring occasion to the 400 persons who gathered in Baltimore to honor him on April 16 and 17. The majority of the 183 physicians who have received their psychiatric training at Phipps Psychiatric Clinic were in attendance along with outstanding psychiatrists from abroad represented by Dr. Henderson of Edinburgh, Dr. Gillespie of London and Dr. Henri Flournoy of Zurich, Switzerland.

The celebration really began on Friday morning with an informal gathering of most of the group at Phipps Clinic where there was a happy opportunity to greet Dr. Meyer. The program on Friday afternoon centered around the following series of papers which were presented by former members of the Phipps staff:

The Dilemma of Growth—Dr. Frederick H. Allen.
Aversion and Negativism—Dr. Oskar Diethelm.
Amnesia—Dr. Robert D. Gillespie.
Syphilitic Arachnoiditis of the Optic Chiasm—Dr. Louis Hausman.
A Review of One Hundred Forty-Four Cases of Affective Disorders—After Seven Years—Dr. Leslie B. Hohman.
Fundamental Factors in the Psychopathology and Psychotherapy of Malignant Disorganization Neuroses—Dr. Edward J. Kempf.
Treatment of Chorea Minor with Electropyrexia—Dr. Clarence A. Neymann.
Catathymic Crisis: A Clinical Entity—Dr. Frederic L. Wertham.

These papers were well received and excellently selected presentations of the clinical and research activity in various centers in this country and abroad.

The climax of the celebration was the reception and banquet held on Friday evening to honor Dr. Meyer. Dr. Campbell as toastmaster called for responses from the various men contacted at different times in Dr. Meyer's career. Most enjoyable responses were given by Dr. Ludvig Hektoen, Dr. Downey Harris, Dr. Frederick Peterson, Dr. Robert S. Woodworth, Mr. Clifford Beers, Dr. Stewart Paton, Dr. Winford Smith, Dr. David K. Henderson

and Dr. Stanley Cobb. Dr. Richards made a surprise presentation to Dr. Meyer of a book containing the photograph of each physician who had been trained at Phipps Psychiatric Clinic along with a statement of their present position. The menu folder was very attractively arranged with an excellent photograph of Dr. Meyer along with an etching of his birthplace at Niederweningen, near Zurich, Switzerland, and an etching of the Phipps Psychiatric Clinic. Dr. Meyer was visibly pleased and expressed appreciation in behalf of his chosen field and the clinic and the work of his pupils, colleagues and associates.

On Saturday, April 17, an excellent program was presented by the present members of the Phipps staff. This program gave a cross section of the extensive clinical and research work now being conducted at the Phipps Clinic. In this, as in the program of Friday afternoon, there was a stimulating feeling of loyalty and affection that was such a vital part of the whole celebration. The older friends of Dr. Meyer who came gave us a feeling of continuity of regard for our Professor and all that he stands for, which to me was one of the sources of deepest satisfaction in the whole affair. The greetings from the older associates at the banquet, together with the papers from former staff members and those of the younger staff, seemed to give a very vigorous portrait of the dynamic individual, Adolf Meyer, in action, and with remarkable freedom from sentimentality or flattery.

Dr. Meyer terminated the meeting by giving a summary of the present day progress in psychiatry and an exposition of his psychobiology. In a characteristic fashion and with deep feeling he presented a resolution adopted by the assembled group honoring his close friend and colleague Eugene Bleuler on his eightieth birthday.

The Johns Hopkins Hospital gave a tasty luncheon at which a large birthday cake was in evidence.

The pleasing dignity of these two days, the renewal of friendships, the demonstration of present day progress of psychiatry, the beloved friend and teacher honored and the happy spirit shown will long be a treasured memory of each of those in attendance. We all fervently hope that Dr. Meyer will have many additional years of service both in the Phipps Psychiatric Clinic and to the continued advancement of psychiatry nationally and internationally.

F. G. E.

EDUCATION AND MENTAL HEALTH.

It has long been the feeling of leaders in psychiatry and mental hygiene that a constructive program for the prevention of nervous and mental disabilities must depend to a large extent upon the utilization of constructive forces in the community that have a bearing upon the shaping and development of personality. In this connection The National Committee for Mental Hygiene has taken an active interest in the evolution of principles and practices in the fields of general medicine, nursing, social work, education—to mention a few.

Of these forces that should be utilized in a comprehensive program for the control and prevention of mental disorders, none presents more promising possibilities than the field of education, particularly as it relates to the elementary and secondary schools.

Indeed, it is the hope of such leaders as Dr. Clarence M. Hincks, General Director of the National Committee, that the schools will go beyond preventive possibilities in mental hygiene and ultimately constitute one of the most potent positive forces working toward more wholesome and effective living. He looks forward to the time " when the schools will develop personalities so rugged and stable that the hazard of a serious breakdown of morale and mental health in later life will be minimized."

Dr. Hincks expressed these sentiments in opening addresses at three regional conferences on Education and Mental Health, conducted during the month of April. These conferences, which were held in Wilmington, Detroit and Philadelphia were conducted under the joint auspices of The National Committee for Mental Hygiene and local mental hygiene organizations, namely, the Delaware Society for Mental Hygiene, the Michigan Society for Mental Hygiene and the Mental Hygiene Committee of the Public Charities Association of Pennsylvania.

To what extent the work of integrating mental health concepts into education has already been carried, was reflected in the nature of the programs at each conference. In each setting the local public and private schools furnished educators well qualified to discuss the mental health implications of their work with the psychiatrists and mental hygiene workers at the conferences. Among these were the Superintendents of Schools of each of the three cities, Dr. S. M. Stouffer, of Wilmington, Dr. Frank Cody, of

Detroit and Dr. Edwin C. Broome, of Philadelphia, who in their discussions presented enlightened concepts of the school's responsibility toward the conservation of mental health. In Wilmington, Dr. Harry V. Holloway, the State Superintendent of Public Instruction of Delaware, was among those who addressed the conference.

A particularly progressive viewpoint was expressed by Burton P. Fowler, head master of the Tower Hill School, Wilmington, who held up the "good" child as an ideal, pointing out that such children are usually too docile to be "bad." This, he said, is an indication that the schools are not facing the task of developing healthy personality traits and building up robust characters. Mr. Fowler also criticized the "reward system" in elementary school education, saying it tended to create in children an unhealthy emotional dependency.

An interesting note was struck by Dr. J. E. W. Wallin, affiliated with the Department of Mental Hygiene of the State Board of Education of Delaware, who said: "If we teachers were not such bores children would rush to our classrooms instead of away from them."

Among the subjects discussed at the various meetings were the following: "The Mental Health of the Teacher," "Mental Hygiene Implications of Non-Attendance," "Partnership Between Parents and Teachers in Mental Health Endeavor," "Mental Health Problems of the Gifted Child," "Dangers and Advantages of Sex Instruction in School," "Can We Combine Mental Health and Cultural Aims in Education," "The Prevention of Mental Disease," "The Mental Hygiene Clinic and the School," "The Activities Program from the Mental Health Viewpoint," "The School's Responsibility in Regard to Delinquent Children," "Diagnosis and Treatment of Reading Disabilities."

Among the psychiatrists who took part in the various sessions were: Drs. M. A. Tarumianz, of Farnhurst, Delaware; George S. Stevenson, The National Committee for Mental Hygiene; Ira S. Wile, New York City; Claude Uhler, Farnhurst; Frederick H. Allen, Philadelphia Child Guidance Clinic; Earl D. Bond, Mental Hygiene Institute of the Pennsylvania Hospital; Camilla M. Anderson, Mental Hygiene Committee of the Public Charities Association of Pennsylvania; Bruce B. Robinson, Newark Depart-

ment of Child Guidance; George H. Preston, Maryland Commissioner of Mental Hygiene; Leo H. Bartemeier, Detroit; Harry August, Juvenile Court of Detroit, Paul C. Dozier of the Institute of the Pennsylvania Hospital.

A feature of the Detroit Conference was an all-medical session devoted to "Michigan's Mental Health—A Challenge to Medicine." Dr. Robert H. Haskell, Medical Superintendent of the Wayne County Training School, acted as Chairman. The leader of the discussion was Dr. James S. Plant, Director of the Essex County Juvenile Clinic, Newark, N. J. and the discussants were: Drs. Martin H. Hoffman, Director, Parole Clinic of the Eloise Hospital; William H. Marshall, of Flint; Raymond B. Allen, Dean of the College of Medicine, Wayne University; J. C. Montgomery, Detroit; and Hugo A. Freund, of Detroit.

In Detroit, Dr. Carleton Washburne, Superintendent of Schools of Winetka, Illinois, criticized "misguided curricula" that attempt to cram the minds of children with material having little or no bearing upon the realities of life.

"We do not succeed in educating children for their social life and we scarcely touch the child's own life," he said. "Mental Hygiene is an attempt to help children to live wholesome, happy and satisfying lives as individuals. This is not a frill in education, but should be the foundation of all education."

Dr. M. Ernest Townsend, President of the New Jersey State Teachers' Training College at Newark, expressed the opinion that the rule against the marriage of teachers in many communities is not only keeping many of the better type of young women out of the teaching profession but is also contributing toward the maladjustment of those in the school system.

"My conviction is that, for the good of the children, women engaged seriously in the profession should be allowed to marry if and when they desire without loss of professional status," he said.

In discussing the possibilities for constructive preventive work in the schools, Dr. James S. Plant, of Newark, said: "We are just coming out of the segregation stage. Now we must seek preventive measures just as we found diphtheria preventives by concentrating on the source of the disease. Mental clinics alone will not suffice because in the clinic we get the case only after the problem has developed."

Among those, not already mentioned, who had a part in the various programs were: Dr. Walter S. Cornell, in charge of medical inspection of the Public Schools of Philadelphia; Dr. Phyllis Blanchard, Psychologist at the Philadelphia Child Guidance Clinic; Dr. Robert G. Bernreuter, Chief of the Division of Special Education of the Pennsylvania Department of Public Instruction; Dr. Grover C. Penberthy, President of the Michigan Society for Mental Hygiene; Dr. Henry A. Luce, Medical Director of the Michigan Society for Mental Hygiene; Maurice A. Bigelow, Professor of Biology, Teachers College, Columbia University; and Harvey Zorbaugh, Director of the Clinic for the Social Adjustment of the Gifted at New York University.

Simultaneously with the conducting of these regional conferences, The National Committee launched its publication: "Understanding the Child," a quarterly magazine for teachers, dealing with the mental health problems of childhood. This magazine was previously published by the Massachusetts Society for Mental Hygiene.

FURTHER DEVELOPMENTS IN MASSACHUSETTS.

In the January issue some comment was made upon the unfortunate developments in Massachusetts which have brought its state hospital system under the demoralizing influence of that variety of politics which has ever made the term one of reproach. Since that report the Massachusetts service has continued to suffer under discreditable political manœuvring so as to call for further comment as a warning to all those who are interested in the welfare of the mentally ill.

Shortly after the inauguration of Governor Charles F. Hurley on January 7, 1937, he restored to the trustees of the Boston State Hospital the authority which had been taken from them in so high-handed a manner by his predecessor. The trustees, a number of whom had served on the board for many years and who represented a very high order of citizenship, were convinced that the welfare of the hospital and of the state service would not be served by the appointment as superintendent of a physician with no administrative experience and relatively little psychiatric experience. With out regard for their opinions, however, or the fact that many

qualified physicians were available in the state service, Dr. Harold F. Norton had been appointed by the commissioner, Dr. David L. Williams, at the direction of Mr. Curley, the former governor. The trustees properly felt that they could not approve the administration of the hospital by an inexperienced physician and voted to remove Dr. Norton from his position.

As soon as Dr. Norton learned of the action of the trustees he called into action the Boston newspapers appealing to them instead of the commissioner or the governor for the remedy of the "shocking conditions" which he alleged existed. The Boston Herald led off with an "expose," broadcasting Dr. Norton's charges that patients "were literally starved," that buildings which had been condemned were still in use, that "drinking orgies" took place, that 300 patients were held virtually as prisoners "merely because they might commit suicide if released." The tone of these and other allegations was suspiciously similar to that of the charges made last summer by Mr. Curley. Their exploitation in the press was facilitated by Dr. Norton who welcomed the cameramen and obtained from some of the employees (even a few physicians) statements corroborating his charges. As indicated in our previous comment a number of physicians and other key employees who declined to make such statements were forced to resign.

Various rumors are afloat as to the means adopted in providing the properties of the several exhibits which the newspaper cameramen were invited to photograph; these will probably come to light in due time. One allegation, to the effect that 300 patients were "held prisoner" and that there were fewer discharges than at other hospitals, can hardly bear statistical investigation; reference to the official reports shows that the discharges at the Boston State Hospital had been considerably higher than at most others, being nearly 7 per cent of the total cases under treatment as compared with the state average of 5.6 per cent.

Governor Hurley on taking office demanded that the trustees appear for a hearing, at which time Dr. Norton and his allies were given ample opportunity to air their charges. Whether because the hearing appeared "loaded" in favour of Dr. Norton or for other reasons best known to themselves, the trustees, although fully aware that the charges were grossly exaggerated or worse, preferred to take no stand in the matter and resigned as requested by the governor. A new board of trustees was appointed.

The next spectacular move was a visit to the hospital by a delegation from the legislature. To them Dr. Norton exhibited the "horrors" he had uncovered. It is interesting that the only physician-legislator in the delegation was far from impressed by the demonstration staged for the benefit of the group, and gave out a very conservative statement to the effect that affairs were not nearly so bad as alleged. In the meantime the state auditor, feeling the urge of duty, began an investigation of his own. Among other findings he reported that the policy of the institution had been "to make as few discharges as possible." In his wisdom he recommended that the hospital "should determine a medium on which the *sanity standard* of the patients could be based in order to expedite their release" (italics ours).

The next stage of the battle shifted to the legislature, the appropriating authority. An increase of $400,000 appropriation for the administration of the hospital had been recommended by the former commissioner; the governor had reduced this to $40,000. Although the preceding administration had asked for an increase of nearly 100 per cent for food the government had allowed increase for only $20,000, or about 10 per cent. Similar reductions in budget estimates had been made previously by Mr. Curley. Dr. Norton at once filed requests for about one million dollars additional for maintenance and another million for repairs. The commissioner, apparently not ready to take a stand, presented Dr. Norton before the Ways and Means Committee, and he loosed another tirade alleging, according to the papers, that patients had been starved to death, and that disturbed patients had been given overdoses of drugs "to remove them from the hospital." These charges received wide publicity from the Associated Press, but fortunately did not greatly impress the Ways and Means Committee. The inordinate demands were so poorly supported by detail and evidence that the committee submitted to the legislature approximately the figure proposed by the governor, plus about $100,000 for construction and repairs. An additional sum has been voted in the supplementary appropriation bill.

As previously reported most of the experienced physicians and heads of departments of the Boston State Hospital were forced to resign, and there remains a staff of some seven physicians to care for nearly 2400 patients. Relatives no longer ask to have patients

committed to this hospital, preferring to send them to the more remote institutions, which so far have escaped serious tampering.

The new board of trustees has been reported as not unanimously convinced of the value of Dr. Norton's services; and the latest development, according to newspaper accounts, is that Governor Hurley has demanded that the new commissioner, Dr. David L. Williams, resign or face ouster proceedings, presumably on the grounds of incompetency, as soon as he recovers from a reputedly serious illness. Thus it would appear that glimmers of hope appear on the horizon. The governor has further announced that an acting commissioner (pending the report of a recess commission made up of two psychiatrists, two judges, an architect and two legislators, which is now studying the problem of the mentally ill) will be appointed from within the department. In these circumstances may be found some assurance that the Massachusetts Department of Mental Diseases will again be placed in the charge of an informed and competent psychiatrist, and that the long and painful task of rehabilitation may at length be undertaken.

News and Notes.

THE WILLIAM ALANSON WHITE PSYCHIATRIC FOUNDATION.—To establish in perpetuity an agency that might carry on the life work of their beloved teacher, Dr. William A. White, a group of his former associates on December 4, 1933, caused themselves to be incorporated in the District of Columbia, as The William Alanson White Psychiatric Foundation. Dr. White joined as a Trustee of the Foundation on February 9, 1934, and became its Honorary President for life. Under his guidance, the purposes of the organization took shape along two major directions. The Foundation should promote research into human personality and interpersonal relations, broadly conceived, and in methods of benevolent intervention in the mental disorders of individuals and in disintegrating, deviate or dangerous social processes. It should evolve post-doctoral training facilities that might reasonably be expected to yield psychiatrists of a wholly new level of competence.

To the latter end, the Board of Trustees of the Foundation voted on April 11, 1936, to create The Washington School of Psychiatry, with, as its original Board of Directors, Drs. William A. White, Ross McC. Chapman, Lucile Dooley, Harry Stack Sullivan, Ernest E. Hadley, Joseph L. Gilbert and Mr. William K. Ryan. The School was duly incorporated on May 8, 1936, a provisional faculty organization and curriculum were worked out, and an active campaign for funds for adequate endowment was about to be launched with view to starting the work of instruction in the autumn of 1937, when the failure of Dr. White's health became deeply disturbing. The Board of Directors of the School had decided that, in addition to the Fellows—carefully selected graduate students of medicine or the social sciences whose tuition is free and who are to receive a stipend for the three years spent in intensive training—and the younger medical men on the staff of mental hospitals in Washington, Baltimore and environs, who would be eligible to certain courses in the School, there should also be contemplated the following additional three classes of students: medi-

cal officers detailed for instruction by U. S. Army, Navy or Public Health Service authorities, and members of the staff of St. Elizabeths Hospital designated by its superintendent; properly qualified members of other medical services of the federal government, the several states or executive subdivisions thereof, detailed by competent authority for special training in the School; and a limited number of special students nominated by the William Alanson White Psychiatric Foundation. This enlarged service of the School depended, of course, on the active participation of Dr. White, and the availability of facilities for lectures, demonstrations and the extensive clinical contacts needed in the intensive orientation, survey and practical courses for U. S. and other medical officers—planned to be completed in a term of 13 weeks.

The nuclear plan of the School centers on its Fellows, a small group of carefully selected younger men who are subjected individually to the most intensive personality study directed by specially trained psychiatrists thoroughly familiar with psychoanalytic and other techniques of personality investigation. Synchronously, they attend lecture-discussions by (1) biologists and physiologists sensitive to the implications of integration and integrator potencies, (2) social scientists—cultural anthropologists, social psychologists, political scientists, economists—alert to the implications of human personality, and (3) psychiatrists skilled in child psychiatry, in the study and treatment of the minor mental disorders and personality deviations, and in the handling of the more grave disturbances. Practical experience in evaluation and formulation of personality facts and fictions begins in the working over of biographical data under direction of an adviser, and with repeated review in seminars including Faculty representatives from the Human Biology, the Social Science, and the Psychiatry Divisions. During the summer between the first and second years, the student is required to complete a term of ten weeks residence in an approved mental hospital, where he works as a clinical clerk and participates in staff conferences and discussions. In the second year, the student is expected to complete the inquiry into his own personality and to make good progress in prolonged interview work with some selected persons, under close supervision. The seminar now becomes a tool both of instruction and of research; a considerable part of the student's time is spent in these group discussions with

competent leaders, and in tutorial conferences with various members of the Faculty, individually. The third year is essentially a year of research, the Fellow performing, under advice of a Faculty Committee, an investigation of some 20 to 30 weeks duration, pertaining significantly to the relation of personality and culture.

The didactic instruction in the first two years is calculated to provide the student with a formulation of man as a biological organism living within and as part of an environment not only physico-chemical and biological, but also cultural in its character. Beginning with insights into those adaptive potentialities and limitations which inhere in the structure of the body, there is a gradual unfolding of the organization of functions which give man his unique world of symbols, the field of mentation. By the end of the third year, the Fellow is expected to have developed refinements as an instrument for participant observation in human affairs that will guarantee the more rapid accumulation of reliable data about living, and thus bring nearer the goal of a scientific psychiatry and psychology of civilization.

With the passing of Dr. White, the Board of Trustees of the Foundation is confronted with an overwhelming responsibility, in the discharge of which it will need much assistance from the Fellows and Members of The American Psychiatric Association, and from others of good will who were touched by Dr. White's boundless efforts for the welfare of his fellows. The immediate achievements of the Foundation are uncertain, its resources are for the most part potential. The project of The Washington School of Psychiatry has already been indicated; the program for research now before the Board for financing includes the following:

A. The William Alanson White memorial research in schizophrenia.
B. The memorial research in the fundamentals of interpersonal communication—part 1, studies in vocal behavior, now in progress.
C. The memorial research in the outlines of human ecology—1. comparative, 2. psychiatric.
D. The memorial project in socio-psychiatric research—1. urban communities, 2. intra-metropolitan areas.
E. The memorial project for personality research—1. personal integrity and psychosomatic reactions, 2. personal integrity and mass psychology, 3. personal integrity and educational methods, 4. personal integrity and power, influence and authority (in family units and in organizations).

The headquarters of the Foundation and of the School are located at 1835 Eye Street, N. W., Washington, D. C., the address of Dr. Ernest E. Hadley, the Secretary of both. The present Trustees of the Foundation are: A. A. Brill, M. D.; Edward Sapir, Ph. D.; Lucile Dooley, M. D.; Randolph E. Paul, Esq.; Harry Stack Sullivan, M. D.; Ernest E. Hadley, M. D.; William K. Ryan, Esq.; Ross McC. Chapman, M. D.; Thomas Harvey Gill, Esq.; and Edwin G. Zabriskie, M. D. The Directors of the Washington School of Psychiatry are: Ross McC. Chapman, M. D.; Lucile Dooley, M. D.; Harry Stack Sullivan, M. D.; Ernest E. Hadley, M. D.; Joseph L. Gilbert, M. D.; William K. Ryan, Esq.; N. Lionel Blitzsten, M. D.; Lewis B. Hill, M. D.; Thomas H. Gill, Esq.; Roscoe W. Hall, M. D.; Tomas Cajigas, M. D.; and Harold D. Lasswell, Ph. D. The Foundation is fiscal agent for the School; Mr. William K. Ryan is Treasurer of both.

CORRECTION.—In the January, 1937, issue of this JOURNAL on pages 854-855 in the discussions by Dr. Falstein and Dr. Weigner of Dr. Weigner's paper on "Chorea Gravidarum" the name of Dr. Gerty appears in error. The correct name is that of Dr. Jesse R. Gertley.

VEREIN FÜR ANGEWANDTE PSYCHOPATHOLOGIE UND PSYCHOLOGIE, HONORARY MEMBERS.—From the office of the *Verein für Angewandte Psychopathologie und Psychologie* in Vienna, through its presiding officer Dr. Erwin Stransky, comes the advice that at the annual meeting of the Association, Jan. 18, 1937, Dr. James V. May of Boston and Dr. Clarence B. Farrar of Toronto were elected Honorary Members.

This Association was founded by Professor Stransky in 1920 and he became its first President. In the March, 1936, issue of the JOURNAL he has given an account of the development of the special field of work for which the Association was formed. Stransky was succeeded by Professor Pappenheim as President, and with the departure of the latter from Vienna in 1934 the founder was again chosen to head the Association.

The list of honorary members of the *Verein für Angewandte Psychopathologie und Psychologie* as reported by the President includes the names of Professors Wagner-Jauregg, Pötzl, Bühler, Freud, Menghin, Pappenheim, Stransky, Obersteiner and Kraepelin.

COMMITTEE SOLICITS MATERIAL FOR BIOGRAPHY OF DR. SALMON.—The Thomas W. Salmon Memorial Committee announces that an authoritative biography of Dr. Thomas W. Salmon, former Medical Director of the National Committee for Mental Hygiene and Professor of Psychiatry at Columbia University, is now in preparation. The publication of a story of Dr. Salmon's life and work, the announcement states, will come as a fitting complement to the memorial projects undertaken in his honor during the past ten years since his death. These include the establishment of the annual Salmon Lectures at the New York Academy of Medicine, the erection of a bronze bas-relief of Dr. Salmon at the New York State Psychiatric Institute and Hospital, and other memorials. The committee invites the cooperation of his former associates and friends and requests them to send in any information they may have in the form of letters, unpublished documents, anecdotes, impressions, recollections or comments that will aid in the production of an adequate work. Any such material the committee receives will be carefully guarded and eventually returned to the senders, if desired. All communications and accompanying data should be addressed to Paul O. Komora, The National Committee for Mental Hygiene, 50 West 50th Street, New York City.

INTERNATIONAL CLUB DES INTELLECTUELS PARIS MEETING.—Dr. Louis C. Barail, National President, annnounces that the International Club of Intellectuals has organized a Convention which is to be held in Paris, during the International Fair, the fourth week of August.

The club has secured for members and their families special round trip rates, which are the lowest possible to obtain, and have arranged for a resort of 6, 10, or 15 days in Paris, other parts of France and European countries, which for a very small sum, cover all expenses, including entertainments and a permanent free ticket to the Exposition.

Any member of the intellectual professions may became a member of the club and have the same privileges as those members already elected. No subscription for this trip, however, will be accepted after June 15, due to the large demand expected for passage on the boats.

For further information, please call or write to the New York Chapter, 120 East 37th Street, AS 4-0747.

DR. R. W. WAGGONER HEADS ANN ARBOR PSYCHOPATHIC HOSPITAL.— Dr. Raymond W. Waggoner, Associate Professor of Neurology at the University of Michigan was appointed Professor of Psychiatry, Director of the Department of Psychiatry and Director of the State Psychopathic Hospital December 4, 1936 to fill the vacancy caused by the death of Dr. A. M. Barrett.

Dr. Waggoner was born in Michigan, August 2, 1901. He was graduated from the University of Michigan Medical School in 1924. He served his rotating internship at Harper Hospital in Detroit, then became resident in neurology in the Philadelphia Orthopedic Hospital and Institute for Nervous Diseases. It was while he was in Philadelphia that he was granted a Commonwealth Foundation fellowship in neuro-psychiatry in the University of Pennsylvania Graduate School of Medicine, from which institution he received the degree of doctor of science in 1929. Dr. Waggoner returned to Ann Arbor as Assistant Professor of Neurology in 1929, and three years later was made Associate Professor of Neurology.

While Dr. Waggoner has been exceptionally well trained in neurology, his thesis for his doctorate dealt with personality changes in chorea and his more recent contributions to the literature in the fields of neurology and psychiatry have dealt with the convulsive disorders, tumors of the brain, and the organic psychoses. It was believed by the University authorities that the appointment of Dr. Waggoner would bring a closer cooperation between the Psychopathic Hospital and the University Hospital.

A bill has been introduced into the present Legislature transferring to the regents of the University of Michigan the State Psychopathic Hospital and calling it the Neuro-psychiatric Institute. If this bill passes no patients will be received on commitment orders,

but as voluntary patients only, excepting patients who may be transferred there by the state hospitals for teaching purposes.

A bill has also been introduced, largely at the request of the superintendents of state hospitals, which has the backing of the past and present Governor, to put all state hospitals under a staggered state hospital commission and give that commission more power, including the power to appoint a director of mental hospitals.

IDENTICAL TWINS' FINGER PRINTS.—At the 1937 meeting of the Royal Society of Canada, Dr. J. W. MacArthur, associate professor of genetics at the University of Toronto, reported that identical twins can be correctly diagnosed four times out of five by comparison of finger and palm prints alone. Comparing right hands with right and left hands with left, Professor MacArthur found differences in patterns between ordinary siblings or fraternal twins to be twice as great as between uniovular twins.

JUNG TO LECTURE AT YALE.—It is announced that Professor Carl Gustav Jung of Zurich, once dubbed by Freud " My beloved son, in whom I am well pleased," but who later diverged from Freudian teaching to develop his own discipline, " analytical psychology," will deliver the Dwight H. Terry lectures for 1937-38 at Yale University. This course will be given October, 1937.

THE SECOND INTERNATIONAL CONGRESS ON MENTAL HYGIENE.—The Second International Congress on Mental Hygiene will take place in Paris, July 19 to 24, 1937. The sessions will be held at the Centre Marcelin-Berthelot, Maison de la Chimie, 28 *bis*, rue Saint-Dominique.

At the opening session Monday, July 19, at 9 o'clock the Congress will be addressed by the Minister of Public Health as presiding officer, followed by Dr. Edouard Toulouse, president of the Congress, Mr. Clifford W. Beers, general secretary of the International Committee for Mental Hygiene, Dr. Georges Genil-Perrin, general secretary of the Congress, and Dr. André Repond, who

will speak on the scientific foundation of mental hygiene. Speakers at the afternoon session are Professor Rüdin of Munich on Eugenics in the Prophylaxis of Mental Illness, Dr. Howard C. Taylor of New York on Eugenic Sterilization, Dr. J. M. Sacristan of Madrid and Dr. Hynie of Prague on Mental Hygiene and Sexuality. Among the topics to be discussed at subsequent sessions are: Mental Hygiene in the Family, Mental Hygiene and Education, Mental Hygiene in Professional Work, The Rôle of Heredity and of Constitution in the Etiology of Mental Illness, The Etiological Rôle of Social Conditions, Alcohol and Drug Addiction, the Proposed International Classification of Mental Disorders, Standardization of Psychiatric Statistics, Scientific Research on the Prophylaxis of Mental Disorders, and other questions on legislation, childhood problems, social relations, suicide, and the organization of agencies for prophylaxis and treatment.

Visits to various institutions, clinics and laboratories have been arranged; and on Sunday, July 25, at 12.30, there will be a final reunion luncheon.

It is also announced that on the evening of Thursday, July 22, an International Dinner will be held in Paris in some restaurant or hotel to be named later. Members of the International Committee and any others in Paris at that time who desire to attend this International Dinner will have the privilege of purchasing tickets for it. The cost per plate will not exceed $3.00.

Active members of the Congress (registration fee 125 francs) may participate in the proceedings and will receive copies of the published reports. Physicians may register only as active members. Associate members (registration 75 francs) may attend all sessions, visits, excursions, etc., but may not participate in the scientific proceedings, and do not receive the published reports.

During the week of the Congress presentation of the registration card will entitle members to free admission to the International Exposition. Registered members of the Congress will also be permitted to purchase a *legitimation* card (20 francs) which will entitle the holder to half-fare admission to the Exposition at other times and to a reduced price of admission to theatres, concerts, public buildings, etc.

Officers of the Second International Congress on Mental Hygiène are: honorary president, Professor Henri Claude; presi-

dent of the Congress and chairman of the Executive Committee, Dr. E. Toulouse; vice-president, Professor Auguste Ley; permanent secretary, M. Clifford W. Beers; general secretary of the Congress, Dr. G. Genil-Perrin; Treasurer, M. Robert Demachy; chairman of the Program Committee, Dr. René Charpentier; vice-chairman, Professor Auguste Ley; chairman of the Committee on Organization, Professor Jean Lépine; vice-chairman M. Joseph Delaitre.

THE FIRST INTERNATIONAL CONGRESS ON CHILD PSYCHIATRY.—This Congress will be held during the week July 24 to August 1, 1937, immediately following the International Congress on Mental Hygiene. The sessions will be held at the same place as those of the preceding International Congress on Mental Hygiene, Centre Marcelin-Berthelot, Maison de la Chimie, 28 *bis*, rue Saint-Dominique. The general topics of discussion at each of which there will be numerous speakers are: Conditioned Reflexes and Child Psychiatry, Educational Problems Relating to Abnormalities of Intelligence and Personality, Mental Deficiency as a Cause of Juvenile Delinquency.

There will be several visits to institutions, clinics and schools. Conditions of registration are similar to those for the International Congress on Mental Hygiene.

Honorary presidents of the First International Congress on Child Psychiatry are:

Germany: Professor Weygandt, Hambourg.
Austria: Professor Hamburger, Vienna.
Belgium: Professor A. Ley, Brussels.
United States: Dr. Healy, Boston.
France: Professor Claude, Paris.
Great Britain: Dr. Rees, London.
Holland: Professor K.-H. Bouman, Amsterdam.
Italy: Professor Cerletti, Rome.
Switzerland: Professor Claparéde, Geneva.
U. S. S. R.: Profesor V. Oseretzky, Leningrad.

CALENDAR OF PSYCHIATRIC MEETINGS.—The American Psychiatric Association is collaborating with The National Committee

for Mental Hygiene to keep on file a calendar of psychiatric meetings in all parts of the country. The office of either organization will be gratified to receive dates and programs, and will have this information available for inquiries. It is hoped in this way to avoid conflict between important psychiatric events. For instance, the Salmon Lectures are an outstanding event of the psychiatric year, and it is hoped that other organizations may be able to set the dates of their meetings in such a way as to allow their members to attend these lectures in as many instances as possible.

Book Reviews.

PSYCHOTHERAPIE. EIN LEHRBUCH FÜR STUDIERENDE UND ÄRZTE. By *Privatdozent Dr. Heinrich Kogerer.* (Wien: Wilhelm Maudrich, 1934.)

The book under review is written chiefly for medical students and general practitioners. In an introductory remark Kogerer gives a short historical sketch of the development of the psychotherapeutic clinic in Vienna. The influence of Wagner-Jauregg in the growth of the institution is acknowledged and its decline with the retirement of the master is bemoaned. Then follows a historical review of psychotherapy. The traditional reference of its antiquity is made. Credit for laying down the foundation of the modern conception of psychotherapy is given to the English physician, James Braid, who was the first to dispel with the supernatural and magic and to show that the influence exercised on the patient springs from the personality of the physician. He also gives credit to Pierre Janet, Joseph Breuer, Freud, Jung, Adler and Stekel, for their contributions in furthering the progress of psychotherapy, and singles out Stransky as the representative of a group of psychotherapists with whom the writer also identifies himself, a group which built up the methods and technique of treatment from actual experience in clinical psychiatry. He regrets the fact that for a long time psychotherapy was in the hands of outsiders with the deplorable effect it had on its development. The rôle played by psychoanalysis and its utilization to some extent, not without preliminary resistance by clinicians like Bleuler, is mentioned. The question who shall be a psychotherapist is discussed in commonsense manner. He rightfully points out that as not everyone is suited for the task of a physician, so are even fewer suited for the task of a psychotherapist. A good psychotherapist must have something within him, sort of a constitutional quality which cannot be acquired, which fact he believes may be the reason why some lay psychotherapists who, though lacking medical education and training, are so successful. While he would generally bar all lay psychotherapists, he nevertheless would utilize the talents of a very few under strict supervision, especially for the treatment of the borderline cases in clinics. He feels that every general practitioner should be able to use psychotherapy, as in every somatic illness there are the accompanying emotional problems which are just as important as the physical condition, if not more so. While many general practitioners, especially the family physicians, are good psychologists who know human nature and are able to meet the emotional problems as they come along in their practice, most of the practitioners, he believes, are in need of some elementary training in psychiatry and in psychotherapy. He strongly advises, however, that serious mental problems should be handled by thoroughly trained specialists. He cites the opinions of the various authorities

regarding the special qualifications. Stransky is of the opinion that a psychotherapist should be endowed with an authoritarian personality of a leader. Adler would want the psychotherapist to be a helping friend, and finally the psychoanalyst takes the standpoint that the personal qualities of the physician in the psychoanalysis plays a small part, while more important is the complete mastery of the technique. The author himself takes a middle course suggesting that the method has to fit the personality of the psychotherapist. Admitting the Freudian erotic physician-patient relationship in certain cases, he minimizes its general importance and instead suggests the principle of trust which he believes is the fundamental basis of all human relationships. He builds up this concept by tracing the development of human society and community through the process of relinquishment of personal interest for the good of the group in exchange for protection and trust. According to this theory the physician is the exponent of the community and his task is to restore in the patient his shattered or lost confidence. At the same time the physician's efforts bring to the patient the pleasure experience (*Lusterlebniss*) which is so important for the restitution of the psychic and emotional equilibrium. While psychoanalysis looks upon this manifestation as an expression of sublimated sexual drives, according to the author it is a more simple but equally important psychological reaction of the "thou-experience" (*Du-Erlebniss*). We would call it positive transference.

The various types of psychotherapy are discussed in another chapter. He begins with the oldest form, namely suggestion, and points out its limitations, as at the best, suggestion may influence symptoms only. However, he believes that suggestion should be applied when immediate help is imperative. It is, of course, of little value in deep-seated psychic disturbances. He then describes the various methods of suggestion, the so-called wake suggestion and the hypnotic suggestion. The wake suggestion may be applied in an open, frank manner or under disguise as a sort of physical treatment. The technique of wake suggestion is briefly sketched. Exercises are given to achieve the feeling of rest, to fall asleep, or to experience sensation of warmth, and to get relief from pain. Next is hypnotic suggestion discussed. The uplifting of the system by James Braid and its freeing from the supposedly magnetic and mysterious forces are acknowledged. The analytic conception of hypnosis as an erotic phenomenon in which infantile sexual mechanisms are at work, with the physician representing the father, is criticised. The attempt of the various investigators to give hypnosis a central representation in the sleep regulatory area in the mid-brain is discussed and the work of Kauder along these lines with drug sleep hypnosis is mentioned. He points out the limitations of the hypnotic therapy; being chiefly a method of suggestion it may be at the best a symptomatic treatment. He found it most efficacious in alleviation of neurotic sleep disturbances. He enumerates the contraindications and warns especially against the use of this treatment in latent schizophrenias because of the frequent occurrence of ideas of influence in this disorder. Neither does he recommend this method for manic-depressive psychoses and hysteria; in the latter condition the method offers the danger of inducing ad-

ditional hysterical symptoms. He suspects in males who resist hypnosis the presence of latent homosexuality, the resistance being a defense against a drive to an erotic relationship. The real merit of hypnosis, as he sees it, is its influence on the muscular tonus and pain. Altogether, however, he can hardly see a real indication for hypnosis. He makes light of the prevailing conception of addiction to hypnosis. Of interest is his discussion of the forensic aspect of hypnosis and the practical advice which he gives to the practitioner in handling erotic women. He rejects it as a method to be used for obtaining truthful testimony pointing out that he who wants to lie will lie in hypnosis as well. A brief discussion is given of the Dubois' method of persuasion, which is a psychogogic method. He discusses the psychoanalytic doctrines and technique adding nothing new. The usual criticism of the one-sidedness of the theory of infantile sexuality and the limitations in its practical application is again repeated. He points to the difficulty with Jung's method of treatment as requiring the possession of the gift of intuitiveness. Interesting is his discussion on religion and its place in psychotherapy. Doubt is cast on Freud's theory that religion is a sort of general neurosis; the fact that severe hysterias may occur in deeply religious individuals rather weakens Freud's view on the problem, in addition he states, there is no statistical proof that religious people are generally less neurotic. Kogerer admits that religion does afford a sense of security. He then discusses the psychogogic treatment, which main aim is the creation of the confidence and guidance of the patient to a better utilization of the inner and outer opportunities for a fuller and happier life. Briefly, his outline in psychotherapy consists in a probing of the patient's past life and difficulties, a study of his personality and of his neurosis. The technique will depend upon the type of patient; no fast and hard rules can be applied. Personal preference and the training of the physician will determine the method. It may be a simple interrogation and in special cases such advanced methods as the association tests. While this acquaintance with the patient is established the suggestive symptomatic treatment may be carried out; as a matter of fact it is automatically done. A wake suggestion in the form of the concentration exercises can be undertaken, especially in somatic disturbances. In some suitable cases hypnosis may be of value. When the cause of the neurosis is established the physician will attempt to convince the patient in the authenticity of the gained insight. Then follows the so-called psychogogic phase of the therapy. During this period the personal power, ability, knowledge and experience of the therapist are paramount.

In a separate chapter the causes of the psychic disturbances are considered. Kogerer begins with the problem of *anlage*, a term for which there is really no good equivalent in English; perhaps the word "tendency" may serve the purpose. While he praises Adler for the attention he has drawn to the inferiority of organs he regrets that Adler failed to pursue along these lines and instead drifted into the concept of psychologic inferiority. The constitutional factors in neurosis, he believes, cannot be dismissed, if one considers the fact that for certain individuals a certain type of a neurotic disturbance is characteristic. These disturbances often appear in the same individual regardless of what the disturbing psychic factor may be. Even in health one can

find evidence of special sensitiveness of an organ or system of organs which becomes the bearer of symptoms during the course of a neurosis. Finally he draws attention to the now well-established fact that lasting neurotic disturbances may lead to functional and anatomic structural alterations. Admitting the possibility of an erotic investment of an organ and the symbolic meaning in the choice of an organ, he feels at the same time that the significance of this process is exaggerated in many instances. There are cases, he states, in which the symbolic mechanism of the "organ speech" is on the surface as, for instance, the nervous vomiting, which may be the expression for a feeling of disgust. He discusses at length the rôle played by the autonomic centers as the possible seat of a constitutional inferiority and utilizing the concepts of Eppinger and Hess, Karplus, Spiegel, Cresel, Wilder and others, he suggests that the so-called organ neurosis may be due to a functional inferiority of the autonomic higher mechanisms. In this connection he draws attention to the psychic accompaniments seen in disturbances of the autonomic nervous system, especially the fear affect. This leads him to the discussion of the concept of fear. The sexual implications in fear as postulated by Freud are minimized. Instead he offers a theory according to which sexual irritation may lead to an imbalance in the autonomic system with the accompanying fear affect.

The inheritance of psychogenic disturbances is discussed and rather commonsense advice is given which the practicing physician will find useful. In this chapter the author reviews quite thoroughly, though perhaps somewhat too compactly for the student or the practitioner, the Freudian doctrines. While he seems to be in sympathy with the psychoanalytic theories as a whole, he points out some of its weak points. He cannot understand, for instance, why Freud named the undifferentiated state during the first period of sexuality, polymorphous perverse, while even according to Freud it can hardly be considered at that stage of human development as a pathologic condition. He then discusses at length the various problems that occur during the sexual development in both sexes and offers practical hints in the handling of various situations. Pollution, masturbation, abstinence, the problem of choice of partner, menstruation, frigidity, prostitution and many other psychosexual and social problems are considered. He is among the few who are willing to admit that the understanding of sexual problems is rendered more difficult by the fact that the psychosexual experiences in both sexes are in all probability not alike, a fact which renders the handling of a patient of the opposite sex obviously difficult. Even with the knowledge gained through enrichment of the medical profession by the increase in the number of women physicians this obstacle has not been overcome. Altogether this chapter is one of the most interesting and offers a wealth of practical information.

The other half of the book is taken up entirely with special symptomatology. In one chapter the author discusses psychasthenia and its treatment. He points out first the difficulty in circumscribing and defining the concept of neurosis, and suggests instead the use of the term of psychasthenia in the sense of Janet, not as a disease entity but rather as a reaction type. The

main characteristic of this reaction is the abnormally low threshold to psychic irritations and the abnormally stormy course of the reaction. He discusses at length the factors which determine the low threshold of irritability; here the constitution, the physical and psychic lesions in childhood and the actual conflicts are of importance. Of particular importance in psychasthenia is the inferiority feeling, especially referable to the body and which is the cause of the so-called hypochondriacal reactions. In this connection he considers the disturbances of the autonomic nervous system. The suggestive symptomatic therapy, according to the author, is particularly useful in psychasthenia. The systematic analytic-psychogogic therapy is indicated when we are not dealing with a simple situational neurosis. In a second chapter the problem of hysteria is taken up. Credit is given to Janet, Breuer and Freud for the better understanding of this disorder. The prevailing difficulties are pointed out, especially the division of opinions as to whether hysteria constitutes a disease entity or is a type of a reaction. Freud's explanation of conversion is criticised; according to the wider definition of conversion, crying, for instance, would have to be considered in all instances as a hysterical symptom. Kretschmer's theory concerning the motor manifestations in the hysterical attacks which he compares to the motility storms and the death reflex in animals is discussed. He refutes Kretschmer's assertion of greater incidence of hysteria among primitive and people of low cultural level. The mistake made by Kretschmer, he believes, may be explained by the fact that Kretschmer overlooks the tendency of the highly differentiated personalities to be careful in the expression of their hysterical symptoms. Kogerer claims that these people do not utilize gross primitive mechanisms. The occasionally accompanying pain in hysteria and especially the nerve trunk pressure pain is due according to Stransky, to neuritides which condition may be an expression of a general state of degeneration. He believes that the best results in hysteria are obtained with the psychogogic method when found in younger patients. Older individuals as a rule lack adaptative power and good intention to be influenced by the personality of the physician. He doubts whether the orthodox psychoanalytic method is more efficacious although he admits that this method may help the physician to gain a better understanding of the patient's difficulties.

Discussing the obsessive neuroses Kogerer criticises Freud's theory of the anal sadistic source of the disorder. He generally denies Freud's concept of the anal erotic character. The child, according to Kogerer, merely utilizes the attention paid by his parents to his stool habits; occasionally play or some other interesting occupation may be the reason why the child delays his bowel movements. Nevertheless, he does recognize the presence of sadistic drives in the obsessive character. The theory of the death instinct as postulated by Freud is subject to particular criticism as being too metaphysical. He traces the development of obsessive tendencies from their every-day occurrence in so-called normal people to the extreme pathologic states and believes that the cause of repetition of doubt, for instance, has its root in an inferiority feeling. In certain instances the obsessive thoughts may even be desir-

able and useful. When, however, it becomes an aim in itself, when it reaches the stage as seen in the type of man commonly known as "*homme au petit papier*" then it is pathological. He acknowledges the meager results obtained in the treatment of obsessive neuroses. Very little is achieved with the symptomatic suggestive treatment. Occasionally hypnosis may be of some value but analytic exploration may be harmful. The only correct method, according to him, especially in old cases, is a purely psychogogically oriented treatment which enables the patient to adjust himself better to his environment and helps him to recognize and avoid mistakes. Encouraging advice, stimulation of self-confidence, are recommended. However, Kogerer is aware of the fact that many obsessive neurotics do not respond to any sort of treatment.

In another chapter a very interesting discussion is offered on psychopathy, but relatively little new is added. The primitive sexual implications in various drug addictions are minimized and instead the theory of Merloo is recommended. According to Merloo every man has the need for an occasional ecstatic mood in which consciousness of reality is so diminished as to afford a better opportunity for a fuller experience of blissfulness and pleasure. Normally this is fulfilled in erotism. When this, however, is impossible a substitute is looked for, and the drugs seem to serve the purpose.

In a final chapter the major biogenetic psychoses are presented; the conception of dementia præcox and Bleuler's schizophrenias are differentiated. Here again advice is given to the practitioner how to handle early cases, and especially the environment in which the patient lives. Discussing the use of the psychoanalytic methods in dementia præcox he warns against a deep probing, as the danger of precipitating an acute reaction is too great. He even goes so far as to advise to cover up the patient's difficulties, to divert his attention from his thoughts and feelings. This is essentially Stransky's "compensatory psychic exercise therapy." Bleuler's autisme is explained along the lines of Stransky's theory, according to which it is an "unclear conscious feeling of being innerly bound," (*"dunkel bewusstes Gefühl innerer Gebundenheit"*).

A few paragraphs are given to the consideration of the manic-depressive psychoses with the warning to be particularly careful in the use of psychotherapy in melancholias outside of institutions because of danger of suicide. The book is wound up with an all too short discussion on the subject of mental hygiene and mass psychotherapy.

While the author promised in his introduction to avoid obstruse theories he could not refrain from discussing all the important schools of thought, giving the student and the practicing physician a liberal introduction into the psychiatric and psychotherapeutic problems. Being written for these two groups one can hardly find fault with the manner in which the material is presented. One may doubt perhaps, the wisdom of an allusion to certain contemporary political and social ideologies in a textbook with a definite practical and didactic aim.

While many of his criticisms of the psychoanalytic theories are well taken a few are of rather minor importance. Altogether, this is a valuable text-

book which seems to be the fruit of a rich clinical experience, a book full of practical hints and advice, which even an experienced neuropsychiatrist will find useful.

J. NOTKIN,
Poughkeepsie.

MEDICAL ASPECTS OF CRIME. By *W. Norwood East, M. D.*, H. M. Commissioner of Prisons. (Philadelphia: P. Blakiston's Son & Co. Inc., 1936.)

This is a miscellany of papers written over a period of 20 years and dealing with medical administration in prisons as well as with psychiatric problems. Dr. East writes with a background of 36 years' experience in British prisons and a number of the papers would be of interest chiefly to British medical men. There are some sections of the book, however, which are of general psychiatric interest. Perhaps the most instructive chapter is that on the relation of the skull and brain to crime. After giving the historical background of phrenology and Lombroso's work in anthropological criminology he draws heavily on Goring's "The English Convict," and with his own experience concludes that there is no relationship between criminal conduct and anthropometric measurements. There are excellent reproductions of drawings from "The English Convict," a work too little known in this country. Other papers deal with attempted suicide, exhibitionism, drug addiction, and prison reaction types. "The commonest causes of attempted suicide," says Dr. East, "are alcoholism, unemployment and destitution, insanity, domestic troubles, morbid mental states not amounting to insanity and attempts made for ulterior purposes. Frequently more than one cause exists at the same time." His approach to these psychiatric problems are anachronistic in that they are lacking in any dynamic concept and do not embody recent psychiatric thought. The book, as a whole, has limited interest for the psychiatrist or criminologist.

MARVIN SUKOV, M. D.,
Chicago.

ELECTRICAL SIGNS OF NERVOUS ACTIVITY. By *Joseph Erlanger and Herbert S. Gasser.* (Philadelphia: University of Pennsylvania Press; London: Humphrey Milford, Oxford University Press, 1937.)

This is the third volume in the series of Johnson Foundation Lectures. The first two, by Professors E. D. Adrian and A. V. Hill respectively, have already taken their place as works of authority on biophysical subjects. To these, Professor Bronk, director of the Foundation, has added a worthy successor in the present monograph. The collaboration is especially fortunate, bringing together two workers whose cooperative efforts proved so fruitful in the early days of modern research on the electrical concomitants of nervous activity.

Of the five chapters in the volume, Professor Erlanger is responsible for the first three. In these he has outlined the methods currently used for

recording nerve action potentials, and the theoretical basis on which the biophysicist rests his analysis of a nerve into its fiber types. The characteristic action potentials of the various fibers are detailed as are also the excitability characteristics of these fibers. Professor Gasser deals, in as great detail as the facts yielded by research permit, with the interpretation of the many forms of action and "after" potentials. His final chapter is a valuable attempt to weld the incomplete knowledge of the present day into an acceptable picture of the cycle of excitability in nerve.

The two eminent authors contrive to keep their differences of opinion out of these lectures. So specialized is their field, and so largely have they contributed to this field, that they are probably their own best critics. Certainly that which both say to be fact, but few others are in a position to gainsay. When both concur on an interpretation it is probably as near the truth as the present state of knowledge permits.

Physiologists will join in the hope that Professor Bronk will continue to inspire these uniquely authoritative contributions to biophysical literature.

D. Y. Solandt,
University of Toronto.

Clinical Psychology. By *C. M. Louttit,* Foreword by *L. T. Meiks, M.D.* (New York: Harper and Brothers, 1936.)

Professor Louttit is well known to the psychological world. His publications have always reflected a very thorough, painstaking and comprehensive treatment of his topic or field. Consequently, as we should expect, his most recent contribution—a handbook of children's behavior problems—is most carefully compiled.

The wide experience of the author as director of the Indiana University Psychological Clinics, and as a teacher and research worker, is the background out of which the present volume arises. Its purpose is to organize the vast array of facts with which the clinical psychologist has to deal into a single systematic presentation. Methods of interviewing and recording; the basic material concerning mental deficiency, school retardation and problems correlated with abilities; problems of delinquency, speech defect, psychoneuroses and psychoses; sensory, neurological and physical disabilities; these are all culled from existing literature, and from the author's experience and are illustrated with a generous array of case-stories. To anyone called upon to teach a didactic course in "Clinical Psychology" there is no question as to the immense value of Professor Louttit's manual. It represents a very high standard in a work of its kind.

In going beyond that statement, the reviewer must of necessity reflect something of his personal attitude towards the whole conception of "clinical psychology." In so far as this term implies a concentration upon the "individual," and upon a comprehensive appraisal of his world, it is universally accepted. Clinical experience, however, points to the danger of any hard and fast analysis of "factors" which can be systematically abstracted

and arrayed, so that the student may, by didactic means, be given the sort of training that produces "clinicians." Professor Louttit obviously realizes this. But in reviewing his book, it is perhaps in order to emphasize that a compilation of this kind of necessity has certain limitations. No amount of abstract knowledge of social and personality variables is in itself adequate. The essential meanings of all that is here arrayed can be appreciated only in terms of actual living problems, and, indeed, after a more thorough study of the fundamental scientific work underlying most of the author's summarized accounts of the position to date. As a handbook for convenient reference, this volume should be of very valuable assistance to the advanced student who has had experience in clinical work. Used purely as a text, as a short cut to clinical training, it would not be serving the function for which the author intended it; for in that case the implication would be that the "clinical psychologist" could, in isolation, apply the results of research in many highly specialized fields If, on the other hand, the working situation itself takes care of the need for coöperative endeavor—as, for instance, between physician, psychiatrist, educationist, and psychologist—then this book will prove to be a valuable production.

Since the emphasis is that of simple, direct presentation of facts and factors pertinent to the problems a clinician has to face, it is perhaps natural that the positive educational and therapeutic aspects are less in evidence. The reviewer feels that some additional attention here would have been well received by everyone. Space, and the general nature of the book, prevented the author from extending his considerations further in this direction. But in consequence, it may be in order to suggest the following, concluding paragraph, since its point of view is crucial to the reviewer's appraisal of the book here being discussed.

Undoubtedly a clinical diagnosis involves an appraisal of symptoms, some of which can be quite clearly defined and observed. To stress symptomatology, however, in any field, is to foster the short-cut method to diagnosis. Diagnosis in itself is naturally of value, since it inevitably points to a condition which usually is undesired, and contrasts with a more desirable state of affairs. The more factual and specific the diagnostic procedure, the more the condition in question can be identified with an abstract array of definite symptoms, the more danger there is of superficial, academically learned, short-cut diagnosis. If psychologists could, for example, devise specific tests which would differentiate a psychotic from a non-psychotic condition, or one psychosis from another, these tests would probably have more dangers than advantages; for the psychiatrist, in arriving at his diagnosis, has approached the problem from such an angle that he has at least attempted to understand the picture of psychological function which he now designates as a named psychotic or psychoneurotic form. In so doing he often develops a picture which suggests lines of treatment, therapy, education; and unless the scientific psychologist uses his science to assist in enriching and checking such functional pictures he is missing the major aspect of his contribution. Similarly with the thorough-going educationist and the school problem. All this

appears to be in perfect harmony with the spirit of Professor Louttit's manual. Its realization is necessary to the positive use of that manual.

W. Line,
University of Toronto.

Sixtieth Annual Report of Statistics of Criminal and Other Offences for the Year Ending September 30, 1935. (Ottawa: Dominion Bureau of Statistics.)

This report represents a summary of criminal and other offences in the Dominion of Canada for the year 1935.

The report is presented in four parts, an introduction and an historical appendix. The first part deals with the indictable and non-indictable offences, indictable referring to the more serious, and non-indictable to the less serious crimes. Part II deals with juvenile delinquents, Part III reviews the number of cases dealt with by the different courts, and Part IV reviews the miscellaneous items such as police and prison statistics, pardons, etc., including also comparative figures for penalties for robbery and burglary for the years 1879 to 1935. The historical appendix gives comparative figures for the years 1876 to 1935.

There were 402,148 trials in Canada during the year ending September, 1935, as compared with 366,152 in 1934 and 331,600 in 1933. There has been a steady increase in non-indictable crimes from 1933 to 1935, with 292,673 cases in 1933 and 362,642 cases in 1935; but the number of indictable crimes in 1935 (39,506) is about the same as the number in 1933 (38,927) with a decrease in 1934 (37,408). There were 33,531 convictions for indictable offences in 1935 as compared with 31,684 in 1934 and 32,942 in 1933; and 362,642 convictions for non-indictable offences in 1935 as compared with 328,744 in 1934 and 292,673 in 1933. There is a table which deals with the ratios of convictions to charges for each of the provinces for indictable offences, which indicated that the ratios of convictions secured is steadily increasing in Canada, from 79.40 in 1926 to 84.88 in 1935; that the greatest percentage of convictions for the period 1926 to 1935 as compared with charges is found in Saskatchewan where 90.67 per cent of all persons charged with indictable offences were convicted. The other provinces are, in order, Alberta, Manitoba, British Columbia, New Brunswick, the Territories, Quebec, Ontario, Prince Edward Island, and Nova Scotia with 72.26 per cent which is the lowest percentage of convictions.

The percentage of repeaters (persons convicted on three or more previous occasions) was higher in 1935 than this group has shown in any previous year; second offenders show a smaller percentage convicted in 1935 than in 1934, and 1935 shows, as did 1934, the smallest percentage of first offenders in five years. There is a slight increase in the percentage of persons fined, given penitentiary sentence and sent to reformatories, and a slight decrease in persons sent to common gaols and given suspended sentences. As for five years previous, the largest number of persons convicted for indictable offences belong to the laboring classes. The greater number of them are unmar-

ried, and by far the greatest proportion of them belong in the group who have had only an elementary education.

Juvenile delinquents are dealt with under two headings, those committing major offences and those committing minor offences. The total number of cases brought before the court in 1935 was 9,397 as compared with 9,448 in 1934. Of these, there is a very slight increase in the number of persons charged with major offences, 6,491 in 1935 with 5,514 convictions as compared with 6,364 in 1934 with 5,353 convictions, and a decrease in the number of persons charged with minor offences, 2,906 in 1935 as compared with 3,084 in 1934. There is no significant difference between repeaters of major offences in 1935 as compared with 1934. The figures still indicate that approximately one of four delinquents has been in court before, that one in nine has had one previous conviction and that one in six has had more than one previous conviction. With regard to dispositions of delinquents, it is of interest to note that there was a greater increase in the number of persons (131 in 1935 as compared with 33 in 1934 and 26 in 1933) who received corporal punishment in 1935 than in any of the ten years from 1926 to 1935, and that there was a decrease in the number of persons (482 in 1935 as compared with 821 in 1934 and 902 in 1933) who were "reprimanded."

Of the criminal cases tried in 1935, 789 were tried by jury, 2,297 were tried without a jury, and 30,445 were tried by magistrates. The comparative figures for 1934 are, 848, 22,155, and 28,681.

The comparative figures for the years 1876 to 1935 indicate that in 1876 there was a total of 28,215 convictions for all offences or 714 convictions per 100,000 population as compared with 403,852 convictions for all offences or 3,892 convictions per 100,000 population in 1935; that there has not been a great deal of difference in the sentences given with the exception of the one kind of sentence, "sentence suspended," which has gradually increased from 1876 to 1935.

MIRIAM V. WINSTON, M. A.,
Toronto.

SO YOU'RE GOING TO A PSYCHIATRIST. By *Elizabeth I. Adamson, M.D.* (New York: Thomas G. Crowell Co., 1936.)

This is one of the "So You're Going" books. Others in the titular series are: "So You're Going to Buy a Book," "So You're Going on the Air," "So You're Going to Have a Baby," etc. If one asks why the market of today is flooded with medico-psychological Baedeckers for nervous prospects, the first answer that suggests itself is that they are popular and sell well. Many a worried person will find in such texts symptoms he never knew he had; thus the medical profession is likely to be encouraged along with the publisher, bookseller and author.

For the long-suffering "intelligent layman" who is not incurious about the by-ways of psychology, the present volume will probably offer as much exposition as he may reasonably wish of psychoanalytic theory—if another exposition is needed to add to the long list of these popular treatises already

on the market (the author apparently uses the words "psychiatrist" and "psychoanalyst" interchangeably). That the perusal of such a work will do the nervous person and prospective patient good is quite another assumption which may be seriously doubted. Bearing in mind that the preceptors of psychoanalysis insist that the subject can only be grasped after long, arduous and expensive individual training, one wonders whether one can consistently expect a primer to be prepared for the instruction of the layman in his solitude. That a neurotic patient should digest and profit by such a presentation is almost too much to expect. Moreover it is not quite clear why a person who contemplates a visit to a psychiatrist or any other physician should have to read a book about it first.

C. B. F.

THE MEDICAL MAN AND THE WITCH DURING THE RENAISSANCE. By *Gregory Zilboorg, M. D.*, (Baltimore: The Johns Hopkins Press, 1935.)

This volume is one of the publications of the Institute of the History of Medicine of The Johns Hopkins University, brought out under the direction of Professor Henry E. Sigerist who writes the preface. The book contains three lectures. The first is entitled, "The Physiological and Psychological Aspects of the *Malleus Maleficarum* (The Witches' Hammer)." As the author points out modern medical science in its Renaissance beginnings dealt with anatomy and general pathology, but took little or no account of psychopathology, which did not appear to belong in the realm of medicine at all and was left to the tender mercies of theology.

Chief among the mental patients of the age were the witches and wizards, and chief among the treatises dealing with them was the *Malleus Malificarum*. Zilboorg outlines the history and character of this infamous book which was published about 1487-89 by direction of the Pope and became the text-book of the Inquisition. Carl Binz ("Doctor Johann Weyer," 1885) describes the *Malleus* as a book "so insane, so raw and cruel, and it leads to such terrible conclusions, that never before or since did such a unified combination of horrible characteristics flow from a human pen."

The *Malleus* details the ways by which devils may injure humanity. There are six, namely—to induce an "evil love" for one of the opposite sex; to stir up hatred or jealousy; to bewitch human beings so as to render them incapable of the genital act; to cause disease in the body; to take away life; to destroy reason. If these were the injuries which devils could do to man, this priestly document which defines them did vastly more. It was the authority for a perverted and bestial outlook upon normal human instincts. The authors of the *Malleus* were morbidly preoccupied with love and sex, even as St. Paul. (Said Havelock Ellis: "The 1500 years that followed the complete conquest of Christianity represent on the whole the most degraded condition to which the marriage system has ever been known to fall for so long a period during the whole course of human history".) Love, according to the monkish text was a mental disorder, and this disorder proceeded from the devil. Did not the devil tempt the first woman in the Garden, and did she not

tempt the first man? And when their eyes were opened and they discovered that they were sexual creatures and acted accordingly, did they not commit the "original sin"? The ecclesiastical pronouncement that the consummation of love was a "filthy act," has fallen as a blight upon the lives of countless women of the generations of those who have believed.

While the *Malleus* is a valuable textbook of mediæval psychopathology, the impression one gains as one reads it is that it must have served admirably its authors Sprenger and Kraemer for the ventilation of their obsessional sadistic woman hatred. Their very vehemence betrays them. "What else is woman but a foe to friendship, an unescapable punishment, a necessary evil, a natural temptation, a desirable calamity, a domestic danger, a delectable detriment, an evil of nature, painted with fair colours! . . . . When a woman thinks alone, she thinks evil. . . . . She is more carnal than a man, as is clear from the many carnal abominations. . . . . She is a liar by nature, so in her speech she stings while she delights us. . . . . The sin which arose from woman destroys the soul by depriving it of grace, and delivers the body up to the punishment for sin. . . . . Woman is a wheedling and secret enemy. . . . . To conclude, all witchcraft comes from carnal lust, which is in women insatiable."

Zilboorg remarks: "The *Malleus Maleficarum* might with a little editing serve as an excellent modern textbook of descriptive clinical psychiatry of the fifteenth century, if the word *witch* were substituted by the word *patient*, and the devil eliminated."

The second chapter, "Medicine and the Witch in the Sixteenth Century," sets forth the popular state of mind, the types of psychogenic mental disturbance characteristic of the period and the medical attitude thereto. It was the age when the devil prevailed, *i. e.*, the devil in the plural. Weyer computed that there were 7,405,926 of him infesting the earth, playing havoc with the souls and particularly with the bodies of men and women. Possession might be single or multiple. In a case reported cured by St. Fortunatus the victim had been possessed by 6670 devils. What is now the field of psychiatry was until the close of the sixteenth century mainly the preserve of the clergy and, as the author points out, their authority and prescription were contained in Leviticus 20: 27—"A man also, or woman, that hath a familiar spirit, or that is a wizard, shall surely be put to death, they shall stone them with stones; their blood shall be upon them."

Although the resuscitated science of classical antiquity was beginning to make headway, the medical man was a child of his age and in his mind it appeared to be possible for sound biological concepts and fantastic beliefs concerning devil possession to dwell together in fraternal harmony. But these are perennial matters. The nineteenth, even the twentieth century have witnessed analogous phenomena.

The concluding chapter, "Johann Weyer, the Founder of Modern Psychiatry," is of particular value in giving a full length portrait of this great man who was born in 1515 or 1516 and died in 1588.

"From the very outset Weyer proceeded to look upon the demoniacal world about him as an enormous clinic teeming with sick people. He set himself

the task of making careful clinical studies and of using his spare time to subject to critical analysis the entire literature of his field. With unmitigated courage and sharpness of tongue, he came out frankly against the mass of ignorant monks, calling them the 'encowled' and bidding them leave the management of witches and the bewitched to the physicians. . . . . He remarked saliently, '. . . . our expenses would diminish considerably if we could put to better use the logs and the bundles of fagots which are now being used to burn innocent people.'"

Weyer's master work, *De Praestigiis Daemonum*, was published in 1563. George Sarton calls it "one of the golden books of the world's literature." Weyer denounced the witchcraft delusion scathingly but judicially. He spared neither the "good pillars of the Church . . . . who act under the mantle of religion," nor misguided physicians who succumbed to similar beliefs, only "ignorant physicians refer a man bitten by a mad dog or afflicted with epilepsy to the Saints of the Church." The alleged performances of witches and devils Weyer held to be incredible and absurd. Rather he found that the human fantasy could be so far disturbed "that the individual sees all sorts of visions and hears all sorts of voices." Thus the hallucinatory nature of certain of the experiences of the bewitched was recognized by this remarkable physician who lived so far in advance of his time. Whatever Weyer may have thought of the universal belief in the existence of a personage called the Devil—and his name was legion—it is certain that he denied him the power of performing the mischiefs commonly attributed to him. Striking also is the fact that in an age of fierce misogyny promoted by the Church, Weyer came to the defence of womankind and demanded for them preferential consideration and leniency.

The spirit which animates the *De Praestigiis Daemonum* throughout is summed up in Weyer's own words: "Love your fellow beings, destroy errors, fight for the truth without any cruelty."

Zilboorg outlines and discusses the contents of this great work in considerable detail, using ample quotation to reproduce Weyer's clinical examples, his interpretations and conclusions.

The book contains a number of well-chosen illustrations, from fifteenth and sixteenth century sources, and is satisfactorily indexed. It is a scholarly treatise and a valuable contribution to the history of social psychopathology.

C. B. F.

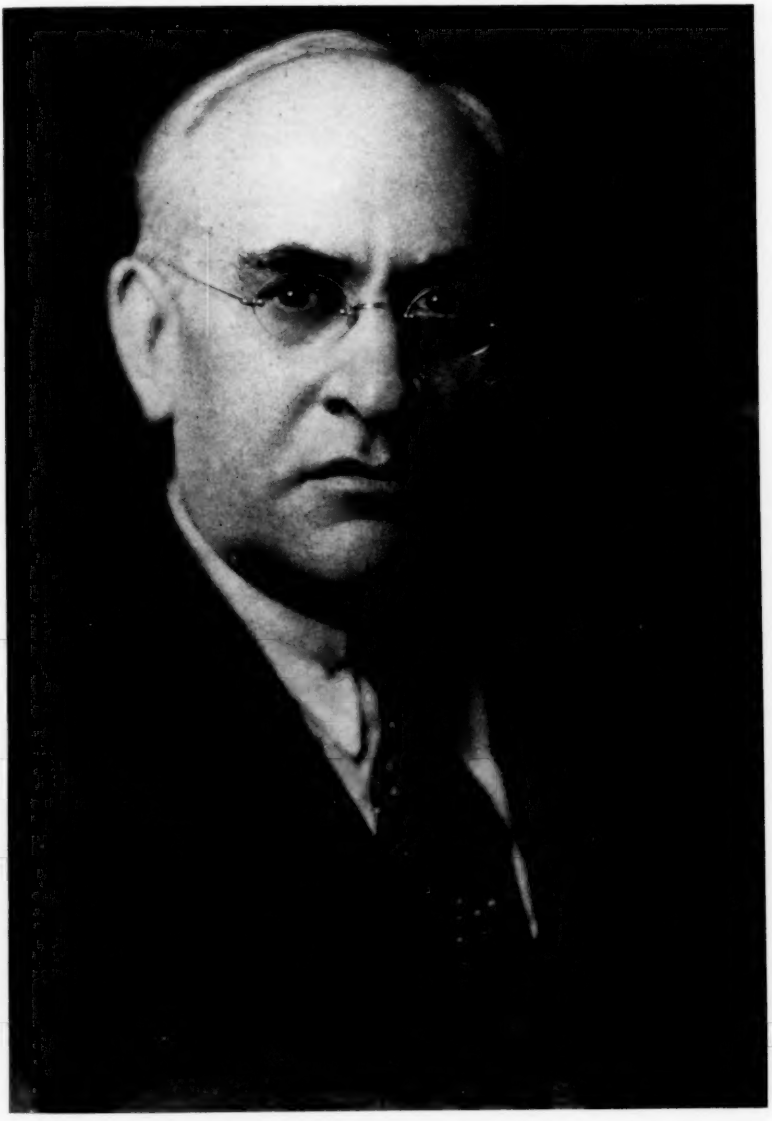
In Memoriam.

WILLIAM ALANSON WHITE.

1870-1937.

The foremost teacher of psychiatry in America, if not indeed in the world; the creator of a great mental hospital—the liberator in fact of the mentally ill from the asylum stigma as the man most effective in elevating them to the status of hospital patients; over all a man of great wisdom and intense humanity; these attributes mark but the more outstanding of our losses in the death of William Alanson White. Some of us knew him as an indefatigable student; some, as a great integrator of knowledge; some, as an inspirer of men; some, as a master of men, a great administrator able to turn disaster to victory, to orient people to their own goals, and to clarify their plans for achievement. Some of us knew him as a "fisher for men," as one who could see through pretenses and errors to a dependable core of personal truth, and cherish it to unexpected fruition. All of us in The American Psychiatric Association have seen him, throughout his all too short career among us, as a genius for clarity, fairness and an open-minded scrutiny of ideas and approaches, a redoubtable foe of archaic prejudice, a councillor divorced from self-seeking and inspired by truly wonderful grasp on the pattern of things to come.

Stemming from New England stock, Dr. White was born in Brooklyn Heights on 24 January, 1870, the younger of two sons of parents in moderate circumstances. At 15, he won a scholarship in Cornell University where presently he laid the foundations for his broad grasp on natural sciences—not however without philosophy, and in fact with the emphasis on biological lines. From there, he went to medicine, taking his medical degree from Long Island Medical School in 1891. He was working in the Alms House, Work House and Penitentiary Hospitals on Blackwell's Island in New York's East River when the future opened before him in the shape of appointment as fourth assistant physician on Dr. Charles G. Wagner's staff at the Binghamton (N. Y.) State Hospital.



DR. WILLIAM ALANSON WHITE.

his personality was evident. This friendship ran through the years and was the first of unnumbered affections which Dr. White attached to himself in the Capitol. Becoming professor of nervous and mental disease in the Georgetown University Medical School in 1903, and professor of psychiatry in George Washington University in 1904, Dr. White immediately stood out as a remarkable teacher. The medical profession of the District of Columbia turned to him as a great clinician and the Army, Navy and Public Health Service medical corps began sending officers to him for training. At the same time that he was developing his great hospital, lecturing, councilling and conciliating, he was also writing the results of his studies and interpreting the obscurities of his less talented but important colleagues. This was Dr. White's life and the rapidity of its expansion needs no comment.

In 1918, he married the widow of Senator Thurston, Mrs. Lola P. White, who survives him. His happiness in the years that have followed is well known to those of us who were privileged to share his occasional moments of leisure. Accustomed from childhood to the company of the great, possessed of the most intense interest in problems of the mind, sharing with Dr. White an enormous energy and devotedness to his objectives, Mrs. White added great social charm and *savoir faire* to complement and somewhat to remedy his too great absorption in his life work. The couple were inseparable; hers is truly a great loss.

The measure of William Alanson White remains for the future; there is no one among his contemporaries who is equal to that task. He died on the eve of receiving one of the honors that the world accords its oustanding men; he already had honorary degrees in number. Not in St. Elizabeths, not in his publication, not in the esteem and affection of unnumbered people who benefited directly and indirectly from his life; in none of these is the great monument of Dr. White. He is most memorialized in the promise of American psychiatry itself.

H. S. S.

ANNUAL INDEX

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In searching for a specific article the Author Index (Part II), should be consulted if the name of the author is known since the complete bibliographic reference is to be found after the author's name only. When there are two or more authors for an article the complete entry as shown appears only under the name of the first author.

R. indicates a book review; the title of the book is followed by the author's name, and is also listed by author under Book Reviews. Ed. indicates an editorial comment.

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